$5.00 a Year Published Monthly 50c a Copy

MAR

VETERINARY MEDICINE

APRIL CONTENTS 1948

Veterinary Progress, Policies and Comments

Army Day, 128; Veterinary ROTC Units to be Re-established, 128; Fourth International Congress on Tropical Medicine and Malaria, 129; San Francisco Meeting of the A.V.M.A., 130; The Veterinarians Relations with the Farmer, 131; Brucellosis Treated by Sulfadiazine and Streptomycin, 132; Curb on Anaplasmosis Planned, 133; Principles of Sulfonamide Therapy, 134; Swine Pox, 134.

Mexican Outbreak of Foot-and-Mouth Disease 136

Diseases of the Nervous System 139

Diagnosis of Foot-and-Mouth Disease 142

Survival of Sheep Nematode Larvae on Pasture During Summer 147

Veterinary Education in Formosa and Japan 149

Veterinary Education in Taiwan 152

Veterinary Problems of the Fur Ranch 156

Vererinary Problems in Poultry Production 157

Clinical Trial of a New Skin Antiseptic 158

Clinical Reports 160-162

Abstracts 163-164

Book Reviews 165-166

VOL. XLIII
No. 4

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

7832 S. Crandon Ave.
Chicago 49, U.S.A.

Jen-Sal

PARENTERAL CALCIUM SOLUTIONS OF OUTSTANDING MERIT

C • B • G
(Non-Precipitating)

A stable 25.7 per cent crystal-clear solution of Calcium Borogluconate primarily indicated in uncomplicated milk fever and the primary hypocalcemic syndromes.

Supplied in:

Box of 12—250 cc. at.....$6.00
Box of 12—500 cc. at..... 8.00

D • C • M
(Non-Precipitating)

A stable solution containing in each 500 cc.: 3.7 ounces Calcium Borogluconate, 2.75 ounces of Dextrose and ⅔ ounce of Magnesium Borogluconate with traces of Phosphorus. D. C. M. is primarily indicated in the treatment of milk fever—especially when complicated with acetonemia—in grass tetany and in other syndromes characterized by low blood levels of calcium and magnesium.

Supplied in:

Box of 12—500 cc. at.....$ 8.40
Three boxes—36—500 cc. at..... 24.44
Six boxes—72—500 cc. at..... 47.88

All borogluconate salts used in C. B. G. and D. C. M. are of organic source produced under exclusive Jen-Sal patent No. 2,007,786.

JENSEN-SALSBERY
KANSAS CITY, MISSOURI *Laboratories, Inc.*

VETERINARY MEDICINE

Registered in U. S. Patent Office

VOL. XLIII APRIL, 1948 No. 4

Published Monthly by the

VETERINARY MAGAZINE CORPORATION

7632 S. CRANDON AVE., CHICAGO 49, ILL., U.S.A.

$5.00 a year; per copy 50 cents

All matter appearing in this publication is copyrighted. No part of it may be reproduced without specific permission. Permission will be given if the purpose is unobjectionable. If there be any question as to the proprietary of reproduction the author will be consulted.

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19, 1910, at Chicago, Ill., under the Act of March 3, 1879.

D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago 49, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
P. O. Box 881, Dover, New Jersey
Telephone Dover 6-2711W.

COPYRIGHTED, 1947, BY VETERINARY MAGAZINE CORPORATION

A first essential in treating cows for *Vibrio jejuni* infection is sexual rest.

* * * *

In the World War I, it was called shell shock; in World War II, neurosis; in young pigs we call it hypoglycemia.

* * * *

Salmonella pullorum was studied for 35 years before it was found to be pathogenic for man. Last year, a single outbreak of this infection sent 173 persons to hospitals.—P. J. BRANDLY.

* * * *

Contrary to what we are apt to think about the cleanliness and freshness of the green fields for grazing animals, they are the most unhygienic places imaginable, wherein the daily food is regularly sprinkled with urine and feces, thoroughly contaminating it with nematode infection.—S. L. TAYLOR in *Vet. Rec.*

* * * *

The Goldberger blacktongue producing diet, which lead to the understanding that blacktongue in dogs is a niacin deficiency, is now known to be deficient in folic acid also and the belief is becoming established that blacktongue is the result of a combined niacin and folic acid deficiency.

* * * *

In experiments conducted by Bennison and Coatney (National Institute of Health), female young chicks were found to be more susceptible to infection with *Plasmodium gallinaceum* than male chicks. They also experienced earlier endothelial invasion and were less effectively protected by quinine.

The Delay

Labor-employer disputes in the printing trade, having closed approximately one-half of the printing plants in Chicago, are responsible for this issue of VETERINARY MEDICINE reaching subscribers about two weeks late. Certain unusual type faces in this issue derive from the same source, which must also explain why some articles planned for this magazine must be held over till May. Further delays are expected.

* * * *

There is no insecticide known that is effective against the tabanids (horseflies). This is a serious handicap in the control of anthrax, equine infectious anemia, and bovine anaplasmosis.

* * * *

The living organism possesses the unique property of self-synthesis. The crux of the aging problem is to determine why this capacity for self-reconstitution gradually fails. —LANSING in *Science.*

* * * *

The USDA is sponsoring a special seminar series on the principles and practice of food technology. The series began February 4th and will continue till early summer. Seminars will be held weekly, from 7:00 to 9:00 p.m. Wednesday. The fee is $18.00.

* * * *

Anaplasmosis of cattle can be transmitted by at least three species of ticks and the infective agent can pass through the various stages in the development of the ticks and infect susceptible cattle months later.

Veterinary ROTC Units to be Re-established

The restriction contained in each annual Military Appropriation Act since 1933, relative to maintaining and establishing veterinary ROTC units, has *not* been included in the 1949 Act. The restrictive clause provided that none of the funds appropriated in this Act shall be available for any expense on account of any student not a member of such units on May 5, 1932. This in effect prevented further enrollments, and the existing veterinary ROTC units ceased to function after June 30, 1934.

Since 1946 the Surgeon General has been endeavoring to get the restrictive clause excluded from the Military Appropriations Act. The first hurdle has been cleared. The number of veterinary units to be authorized by the Department of the Army will depend, in part, on the funds available for the entire ROTC program in the Military Appropriation Act for 1949 as passed by Congress. This information may not be available until May, 1948.

As it is desired to activate the veterinary ROTC units on July 1, 1948, which may be established, and start operation of these units with the commencement of the school year in 1948, preliminary studies and plans have been made in the Surgeon General's Office. Therefore, the Chief of the Veterinary Division is making arrangements to visit the dean of each veterinary school in the near future and explain the Medical Department ROTC program, and also make preliminary arrangements for the establishment of veterinary ROTC units in those institutions willing and ready to commence the program this year.

Approximately one year ago all universities or colleges having schools of veterinary medicine, meeting acceptable standards, were circularized regarding their interest in and willingness to establish veterinary ROTC units. It is significant that all 10 schools contacted submitted applications for a veterinary ROTC unit. The current Medical Department Reserve Officers Training Corps program has features which should prove attractive and beneficial not only to the veterinary student but to the dean and the other faculty members. It must be reiterated, however, that the number of units activated will depend on the funds available.

Growth of Public Health

"Seventy-five years ago, when the American Public Health Association was founded, General Grant was President of the United States, and yellow fever was a constant threat in the Gulf States and along the Atlantic seaboard. Cholera was epidemic in more than 200 cities and towns in the Mississippi Valley. State boards of health had been set up in only four states of the Union, . . . Local boards of health were beginning to be created in a handful of cities, but they were for the most part dominated by politics; and when the Mayor of New York was asked by a medical delegation, alarmed by an approaching cholera epidemic, to summon the Board of Aldermen which was also the Board of Health, he replied: 'I will not call the Board, for I consider it more dangerous to the city than cholera'."—From an address by RAYMOND B. FOSDICK at the 75th annual meeting of the American Public Health Association.

* * * *

Fourth International Congresses on Tropical Medicine and Malaria

The Fourth International Congresses on Tropical Medicine and Malaria will meet in Washington from May 10 to 18, 1948, under the sponsorship of the Department of State with the cooperation of five government agencies and 15 scientific societies. Over 60 governments have been invited by the Department of State to send official delegations. The Organizing Committee in charge of program and arrangements is made up primarily of representatives of the sponsoring bodies and has as its officers Dr. Thomas Parran, chairman, and Wilbur A. Sawyer, Executive Secretary. A comprehensive program has been prepared with emphasis on the great advances in tropical medicine since the previous joint meeting of the two international congresses on Tropical Medicine and on Malaria in Amsterdam in 1938.

Twelve Scientific Sections

There will be twelve scientific sections covering the following fields: research and teaching institutes, tropical climatology and physiology, bacterial and spirochetal diseases, virus and rickettsial diseases, malaria, helminthic diseases, protozoan diseases, nutritional diseases of the tropics, tropical dermatology and mycology, tropical veterinary medicine, public health, and medical and veterinary entomology. Visits will be made to the National Institute of Health in Bethesda, to the Research Center of the Department of Agriculture in Beltsville, and to other institutions and laboratories in and around Washington. Two evening sessions will be devoted to the recognition of great achievements in scientific medicine in the tropical field. One will commemorate the fiftieth anniversary of the discovery by Ronald Ross of the way in which malaria is transmitted, and the other will commemorate the demonstration by Walter Reed of the mosquito transmission of yellow fever, and celebrate his admission to the Hall of Fame. The delegates and members will be brought together in several pleasurable social events.

Membership

In addition to the Official and Institutional Delegates, there will be enrollment of physicians, doctors of veterinary medicine, sanitary engineers and other professional persons with qualifications and interest in the field of tropical medicine as members of the congresses. Students, non-professional persons, and members of the families of professional members, may enroll as associates, without the right to participate in discussion or to vote.

Five Sections Will Discuss Matters of Veterinary Interest

The American Veterinary Medical Association is one of the organizations cooperating with the Department of State in sponsoring the congresses. The Association is represented on the Organizing Committee by General R. A. Kelser who is also serving as Convener of Section X, tropical veterinary medicine. Papers have been invited for this Section on such subjects as rinderpest, avian pneumoencephalitis, foot-and-mouth disease, schistosomiasis in animals, epizootic lymphangitis and trypanosomiasis in cattle. Distinguished scientists from abroad and from America are accepting invitations to speak. Other Sections of special interest to the veterinary medical profession are Section XII, medical and veterinary entomology; Section III, bacterial and spirochetal diseases, and Section IV, virus and rickettsial diseases. In Section IV the newer methods for the control of rabies will be discussed, a subject of great interest to all countries.

Those interested should write to the Executive Secretary, Fourth International Congresses on Tropical Medicine and Malaria, Department of State, Washington 25, D. C., U. S. A., for the preliminary announcement and the advance registration and hotel reservation form.

Cliff House — with seals disporting themselves on the rocks only a few hundred yards from shore

San Francisco Convention Bureau

San Francisco Meeting of the A. V. M. A.

To those who remember the Cincinnati of last August the most attractive feature of the A.V.M.A. meeting to be held in San Francisco next summer is the 65° F. average daily temperature of that city in August. Advice to those who contemplate attending the 85th annual convention of the A.V.M.A. to "bring top coats" will exert a strong pull on veterinarians over almost the whole country. It is sound counsel too.

Three meetings of the A.V.M.A. heretofore held on the West Coast—one in Los Angeles and two in the Bay Cities—have all been notable meetings, and plans are underway to make the fourth a compeer of its predecessors. Entertainment features will likely eclipse anything in A.V.M.A. history. Eight sight-seeing trips, alumni dinners and banquet, the president's reception, a speed boat trip on the bay, a deep-sea fishing trip, dinner in Chinatown, etc., will be supplemented by a conducted tour from Chicago to San Francisco and an excursion to Honolulu by air. Dr. J. M. Arburua is general chairman of the committee on local arrangements.

The scientific program has not yet developed to a stage where particulars can be given but A.V.M.A. headquarters gives assurances that it will attain excellence. The convention headquarters will be at the Palace Hotel. The dates are August 16 to 19, 1948.

California is the most amazing of the 48 states. It is well worth a trip to the West Coast just to see it. An opportunity to attend the A.V.M.A. convention is net gain. Since 1940 California's increase in population equals the combined population of New Orleans, Minneapolis, Milwaukee, Cincinnati, and Buffalo. Or to put it another way, in seven years California's increase in population, 2,895,000, exceeds the present population of such states as Washington, Iowa and Florida. Two-thirds of this increase was in the Bay Cities metropolitan area. California is first among the states in agricultural production and more than 90% of its farms are electrified.

Law to Promote Research in Medical Sciences

A statute enacted by the legislature of Michigan in 1947 provides:

"The State Commissioner of Health, with the approval of an advisory committee, shall adopt rules and regulations controlling the humane use of animals for the diagnosis and treatment of human and animal disease, the advancement of veterinary, dental, medical and biological sciences, the improvement and standardization of laboratory specimens, biological products, pharmaceuticals and drugs."

The advisory committee is comprised of the deans of medical, dental and veterinary schools in the state, one representative of research laboratories and two representatives of humane associations.

Author of Dollar's Surgery Dies

John A. W. Dollar, F.R.C.V.S., 80, who qualified at the Royal Veterinary College, London, in 1887, died November 11, 1947. Mr. Dollar was a veterinarian of great learning and distinction and was long active in veterinary affairs of his native land. In this country he is known for his surgery, which a whole generation of veterinarians studied as students. In fact, as revised by O'Conner, it is still, after 36 years, in demand by veterinarians and veterinary students.

Early Antibiotic Therapy

Louis Pasteur was the first to record observations of the phenomenon of antibiosis. He drew blood from the carcasses of three animals dead of anthrax—a sheep that had been dead 16 hours, a horse that had been dead a little more than a day and a cow that had been dead two days. In the sheep's blood he found only anthrax organisms. In the blood of the horse and the cow he found only putrefactive organisms. Experimental animals injected with the sheep's blood died of anthrax. Those injected with the blood of the other animals died of sepsis. When he mixed anthrax organisms and putrefactive organs and injected them into experimental animals they died of sepsis and the anthrax organisms disappeared; thus demonstrating that some bacteria or their products are antagonistic to others—even capable of destroying them.

Low Grade Proteins and Animal Proteins

Hypoproteinosis according to Dr. Francisco Miranda *(J. Am. Med. Assn.)* is the most common disease in the world. Essentially it is deficiency of essential amino acids due to low grade proteins contained in the ration and in many instances substitution of carbohydrates —tubers, rice, corn, cassava—for proteins. In dogs we have called it "hidden hunger."

The prophylaxis and the therapy too call for a greater and more productive industry in most countries of the world. The proteins from animal sources are the high quality proteins.

Miranda observes, that hypoproteinosis specially affects young children in whom it stops or delays growth and lowers their resistance to all manner of disease. If the child lives till it is six years of age it becomes adjusted to protein deficiency at an all-around lower level but the symptoms of hypoproteinosis—dry scaly skin; cold hands and feet; low blood pressure—will persist even in the adult.

Erratum

In the title of the article on page 118 in the March issue of VETERINARY MEDICINE furacin (5-nitro-2-furaldehyde semicarbazone) was referred to as "a new bacterial agent". Of course, "antibacterial" was meant, since furacin is a synthetic compound.

The Vet and the Farmer

We have watched with considerable interest the changing relationship between the veterinarian and the livestock owner. It is a healthy change in that many veterinarians are now becoming more closely associated with dairy herds on a regular basis. Where veterinarians conduct monthly pregnancy examinations of good dairy herds, it is the first step toward a working arrangement that is of mutual benefit to the livestock owner, the veterinarian, and the entire industry.

Those veterinarians who cling to the philosophy of clothing their work in secrecy and stimulating an air of mystery are not building a practice that will thrive nearly as well as those who take farmers into their confidence and do a thorough job of education.

Veterinarians are a vital segment of our American livestock industry and they should work in cooperation with all other segments. Too often the veterinarian has no contacts with the industry other than his sporadic visits to the farms of his clients. We believe that veterinary practice and the veterinary profession would be well served by veterinarians participating actively in livestock organizations and general farm organizations. We believe they would benefit considerably from speaking at every opportunity, to local livestock groups. The subject of disease control and herd health is one of the most important and critical problems of our time. The more conscious the dairy farmer becomes of the economic importance of disease control, the greater will be the veterinarian's practice.

When the day comes that veterinarians are active members in the Grange, the Farm Bureau, and breed associations, we can look forward to much more rapid progress in disease control and eradication, thriving veterinary practices, and more profitable dairy herds.—*Hoard's Dairyman.*

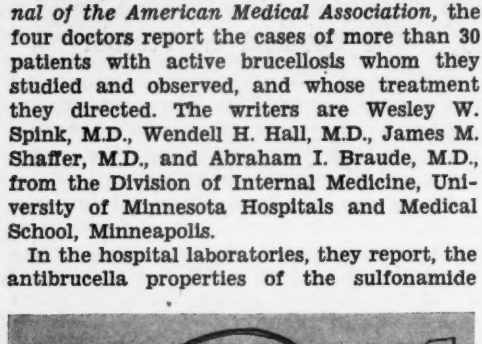
Brucellosis Best Treated by Sulfadiazine, Streptomycin

Investigations carried out over a 10-year period in the laboratories and clinics of the University of Minnesota Hospitals indicate that combined treatment with streptomycin and sulfadiazine is more effective against human brucellosis than any other known therapy, four physicians announce.

The Brucella organism is transmitted to humans by contact with diseased hogs, goats or cows, or by drinking the milk of infected animals.

Writing in the February 7 issue of *The Journal of the American Medical Association*, the four doctors report the cases of more than 30 patients with active brucellosis whom they studied and observed, and whose treatment they directed. The writers are Wesley W. Spink, M.D., Wendell H. Hall, M.D., James M. Shaffer, M.D., and Abraham I. Braude, M.D., from the Division of Internal Medicine, University of Minnesota Hospitals and Medical School, Minneapolis.

In the hospital laboratories, they report, the antibrucella properties of the sulfonamide



Schematic drawing showing the extra-embryonic membranes of the chick and the point of inoculation upon the serosa (chorion). Ten-day embryo.

compounds and the antibiotics were tested on chick embryos which had been inoculated with a culture of Brucella. Used separately, sodium sulfadiazine and streptomycin both prolonged life, but in a majority of cases failed to destroy Brucella organisms. Only the two in combination achieved that.

Both before and after these chick embryo experiments had yielded results, human patients with bacteriologically-proved brucellosis were being treated and studied in the University of Minnesota Hospitals. Many had been ill for several months, and severe complications were present. In both acute and chronic brucellosis cases, a sulfadiazine-streptomycin combination brought the most satisfactory results. Furthermore, other patients whose symptoms pointed to brucellosis as the most probable diagnosis also responded well to the combined therapy, although the presence of Brucella organisms in their tissue or body fluids had not been proved.

* * * *

Control of Brucellosis in Dairy Herds

Within the past two years a growing wave of suspicion, resentment and criticism has swept through the dairy cattle industry. Its main focus has rested on the blood test for brucellosis and secondarily the respective state and national brucellosis control programs. Fanned by articles in national dairy breed publications and by the outspoken opinions of some veterinarians and dairy cattle breeders, this sentiment is mounting to stand in the way of a long time national control program aimed at the eventual eradication of this disease.

The problem as it exists today requires first, a clear cut statement of the known facts about the disease and its control. The next move must be an intensified, mass educational program to acquaint the livestock industry with the facts. While the foregoing are in process of fulfillment, a strong unified national brucellosis control program must be formulated and prepared for activation.—WILLIAM D. KNOX, Associate Editor, *Hoard's Dairyman*.

* * * *

Milk Borne Outbreak of Brucellosis[1]

During January and February, 1946, 28 cases of human brucellosis were reported in Federalsburg, a small town in eastern Maryland. *Brucella abortus* was isolated by the Maryland State Health Laboratory from two human cases. The other human cases had positive blood agglutination and clinical symptoms of the disease. Epidemiological investigations by the local health department attributed the epidemic to infected milk that was distributed during the Christmas holidays by a local raw-milk dealer.

During the Christmas season there was a shortage of milk in the community and the local milk dealer purchased additional milk from an uninspected source (Herd 3). This uninspected milk was used only when the normal supply was not sufficient. In this way there was no factor of dilution which would have prevented the ingestion of a large number of organisms by the individuals who used this infected milk.

The Maryland Live Stock Sanitary Service

made an investigation of the raw-milk source and found that Herd No. 3 contained 14 adult animals of which seven were reactors to the brucellosis test. All reactors had high titers except one. It was reported that there had been many abortions in this herd. None of the animals have been vaccinated.

This is the first large brucellosis epidemic reported due to *B. abortus*. Epidemiologists and public health officials have offered various reasons why *B. abortus* has never caused any sizable epidemics such as *B. suis* and *B. melitensis* have caused. In the past the reason most commonly advanced has been that *B. abortus* is less virulent and invasive for man than *B. suis* and *B. melitensis*. This disease outbreak does not support that view but does present evidence that *B. abortus* can be the cause of an epidemic when the bacteria are present in large numbers and are not diluted by clean milk. The spread of brucellosis through milk can be stopped by the eradication of brucellosis in cattle or the pasteurization of all milk supplies.—By JAMES H. STEELE, D.V.M., *Scientist (R), United States Public Health Service* and J. W. HASTINGS, SR., V.M.D., *Assistant Director, Maryland Live Stock Sanitary Service, U. S. Pub. Hlth. Rept.*, Jan. 30, 1948.

[1] From Veterinary Public Health Division, Communicable Disease Center, United States Public Health Service, Atlanta, Georgia, and Maryland Live Stock Sanitation Board.

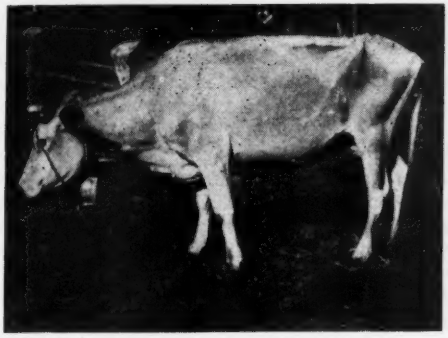
* * * *

Research Workers Plan Curbs on Anaplasmosis

Establishment of a research program, on a national basis, to develop improved methods of combating the costly cattle disease, anaplasmosis, was agreed on at a conference of research workers held in Washington, D. C., February 10 and 11, 1948, the USDA announces. The meeting, sponsored by the Bureau of Animal Industry, was attended by representatives of research institutions of Alabama, California, Colorado, Florida, Georgia, Kansas, Louisiana, Maryland, Oklahoma, Texas, and Virginia, and staff members of the Bureau's Zoological and Pathological Divisions.

The disease is reported to exist in 27 of the 48 States and is particularly troublesome in southern and south-central areas of the country. The estimated national loss from anaplasmosis last year was between $3,000,000 and $4,000,000. In Oklahoma, alone, it exceeded one-half a million dollars.

The results of the conference, which was of fact-finding nature, are to be used in establishing a coordinated Federal-State research program for better control of the disease and the losses it causes. A meeting for this purpose has been called for April 2 at the Regional Animal Disease Research Laboratory, Auburn, Ala., to be attended by research workers in the Southern States.



Typical attitude in anaplasmosic. Many cases of the disease have been treated in the field in Oklahoma.

Animals affected with anaplasmosis develop various symptoms including a rapid heart action, labored breathing, fever, and extreme anemia. Other common symptoms are exhaustion, loss of appetite, and tendency to lie down or walk with an unsteady gait. Mortality is usually between 30 and 50%.

The desirability of importing mouse-deer, which are about the size of a rabbit, for experimental work, owing to the unsuitability of other small laboratory animals, was discussed.

* * * *

Loss Due to Bruising of Swine

Evidence that the annual bruise losses in swine slaughtered in this country aggregate millions of dollars annually, was revealed in a report presented at the annual meeting of the American Society of Animal Production in Chicago November 29th by Harold A. Henneman and Ralph May of Wilson and Company.

The report covered a study made by these men in cooperation with the National Live Stock Loss Prevention Board between March, 1946, and September, 1947. During this 18-month period, the average bruise loss per hog was 19 cents. Using the 1946 federally inspected slaughter figure of 44,394,000 hogs, the bruise loss from hogs slaughtered at federally inspected plants alone would total more than $8,400,000.

The tests reported by Henneman and May showed that 39% of the carcasses were bruised. The lowest percentage of bruises showed up in

the May and June slaughter—the figure being 30.5%. In July and August and also in November and December, 47.0% of carcasses showed bruises.

Swine Pox

Swine pox is encountered frequently in the corn belt. As a general rule it is mild and the mortality is low.

This disease is characterized by inappetence, high temperature and pustules on the skin which rupture and scab over. Often it is detected only when the animals are restrained for vaccinating or other purposes. These mild cases apparently do not interfere with the serum-virus treatment, but there is always added risk in immunizing even mildly affected droves. Smith experienced a high mortality in pigs vaccinated during an outbreak of pox in the drove in Oklahoma. Swine pox varies much in severity and consequently in symptoms. Exceptionally highly virulent outbreaks occur in which the mortality may run as high as 50%. In such attacks eruptions may extend all over the body.

Necropsy.—In acute cases, septicemic lesions are revealed.

Control.—The swine pox virus is transmitted from animal to animal by the hog louse. Small pigs or shotes are usually affected, but mature sows have been noted to contract the disease in a few instances. The only method of control is to rid the swine of lice by repeated dipping or spraying. In the past sulfurized oil has been the spray material of choice. To be up-to-date, perhaps one should spray the animals with a 1% aqueous suspension of DDT, with an interval of 20 days between sprayings.

Principles of Sulfonamide Therapy

1. Sulfonamides are widely used chemotherapeutic agents and when properly employed they are the most potent weapons developed in recent years in the treatment of many bacterial and some protozoan infections in animals.

2. The compounds for clinical use should be selected on the basis of their pharmacologic characteristics and antibacterial or antiprotozoal activity.

3. Adequate and proper dosage should be employed in order to obtain maximum results with the sulfonamides. In general, the initial, oral dose should be equal to the total daily requirement as determined on the basis of the body weight of the patient. Subsequent dosage and time intervals for giving are dependent on the pharmacologic characteristics of the drug.

4. Aqueous solutions of the sodium salts of most sulfonamides are satisfactory for intravenous and possibly for intraperitoneal use. They are ideal for obtaining high blood concentrations promptly.

5. Three to five-day treatment with sulfonamides is usually sufficient to bring about marked clinical improvement in most responsive cases.

6. Adequate water supply should be provided for all patients receiving sulfonamide therapy, especially when compounds are used that readily are absorbed from the gastrointestinal tract.

7. If infections fail to respond to sulfonamide therapy within a few days, when the compounds are given in adequate dosage, they should be discontinued and other treatment should be instituted.—S. F. SCHEIDY, V.M.D.

Streptomycin Resistant Organisms

Alexander and Leidy,[1] in a study of the capacity of certain pathogenic organisms to develop streptomycin resistance, inoculated media containing 1000 units of streptomycin to the cc with enormous number of *Hemophilus influenzae* obtained from 14 cases of meningitis, 10 of which had been cured by streptomycin. They obtained a few colonies, thus indicating that occasional bacterial cells (one in billions) passes high resistance to streptomycin.

Carrying the habituation further Miller and Bohnhoff[2] have shown that meningococci, originally highly susceptible to streptomycin, can be trained within a week to withstand 75,000 units per cc. In an extension of these studies[3] they have observed two types of resistant variant. One of these is unchanged except in its capacity for resistance to the drug; it grows normally on all media, whether containing streptomycin or not, and retains its previous pathogenicity for mice. The second type grows only on streptomycin-containing media, having lost its capacity for growth on ordinary media altogether. Its behaviour in mice corresponds: avirulent in the ordinary sense, it assumes full virulence, producing a fatal infection, only in animals treated with streptomycin. What are we to think of a chemotherapeutic agent which can become an essential growth factor for a previously susceptible organism?—*British Med. J.*, Jan. 3, 1948.

[1] *J. Exp. Med.*, 85, 29, 607. 1947.
[2] *J. Am. Med. Assn.*, 130, 485. 1946.
[3] *Science*, 105, 620. 1947.

Bovine TB Suppression Required 50 Years

Many seem to believe that measures for eliminating tuberculosis from our herds were developed in 1918 and the work of eradication commenced in that year with the result of suppression of the disease in all the states within a 25-year period. The facts are, information was being accumulated and plans were being matured with a view to eradication of the disease 25 years before the 1918 project was launched. Attempts at eradication were made in two states and the District of Columbia in the early 90's. In 1893 the Congress appropriated $100,000 for the eradication of bovine tuberculosis in the latter.

The report of the Chief of the Bureau of Animal Industry, USDA, for 1893 states:

Preliminary steps have been undertaken for determining, more accurately than is now known, the proportion of animals affected with tuberculosis, the best means of detecting the disease, and the most practical means for its prevention and eradication.

B. A. I. Annual Report—1893

Heretofore all tuberculin to be obtained in this country was imported from Europe and sold at prices which greatly restricted its use. There is now great demand for it, but the facilities of the Bureau have hardly been sufficient to supply local authorities who have been using it. Public interest in the question of limiting the prevalence of tuberculosis is increasing rapidly and one state after another is taking up the work. It is probable therefore, that preparations must soon be made for preparing tuberculin in much larger quantities than heretofore. There is certainly no other way in which such valuable assistance and cooperation can be given to local authorities with the same expense.

The Chief's report for 1894 states:

The testing of cows with tuberculin in the District of Columbia is now in progress, but has been commenced in a small way in order to develop a satisfactory plan of operations.

I would now recommend a larger force and more vigorous operations. With present force and facilities, but a few thousand dollars can be used during the year of the $100,000 appropriated for this purpose. With twice as many men and better facilities for getting over the ground several times as much work can be accomplished.

This work in the District is of great importance, not only as a preventive of disease among the consumers of meat and milk, and to guard against the spread of tuberculosis from the District into adjoining states as required by law, but as an experiment to determine various questions relating to the prevalence, recognition and prevention of tuberculosis as affecting dairy stock. The scientific results of this work are therefore of great value to the whole country, while the practical work is of value to only a small section.

These scientific results are urgently needed in order that the various states may formulate proper measures for protecting their citizens, and for that reason, if for no other, the work should be pressed to early completion.

Importance of An Animal Industry

One thinks of the property destruction in war ravished countries as being mainly of factories, warehouses, residences and other buildings and bridges, roads and crops. Time, however, shows that a greater loss, requiring longer to repair and causing more suffering in occupied countries is depletion of the animal industry.

This is illustrated by present conditions in the Republic of the Philippines, in which all Americans have an interest. Dr. Vincente Ferriolo, Director of Animal Industry, in discussing the most pressing problem facing his bureau says:

"Three and one-half years of indiscriminate slaughter of livestock by the Japanese invaders as well as by the Filipinos themselves in the resistance movement and in the evacuation areas have set back the livestock industry to where it stood in the first decades of the century, when large numbers of beef cattle had to be imported from Australia and Indo-China to supply Manila with meat and the scourge of rinderpest was at its worst."

To reduce to a minimum the slaughter of native cattle and carabaos, the immediate importation of large quantities of beef is required. With the country's recent experience of devastating epizootics in mind the choice would be for the importation of frozen beef, but sufficient refrigerator boats are not available so a large part of it must be imported on the hoof from North Australia and India. Contagious pleuropneumonia is prevalent in the former area and foot-and-mouth disease, rinderpest, piroplasmosis, trypanosomiasis and many other plagues in the latter country. These diseases complicate the sanitary problem.

The Japanese decimated the work animals, particularly carabaos, which are indispensable to the growing of rice and sugar, and the heavy lumbering essential to rebuilding. The carabaos saved in remote provinces are unbroken to work and are not the kind needed immediately on the farm and plantations. Thus work animals, too, must be imported from India with all the disease hazard that entails. In addition, purebred animals must be imported to replace the lost foundation breeding stock.

The rebuilding of the livestock industry of the Philippines, and to a large degree the progress of rehabilitation of the nation, depends upon its veterinary service. The veterinarians of the Island face an extreme test of their science, their skill and their devotion to the public welfare.

Mexican Outbreak of Foot-and-Mouth Disease

In a summary of developments, consequent upon the threat that the outbreak of foot-and-mouth disease in Mexico constitutes to our livestock industry, the Bureau of Animal Industry of the USDA has issued the following statement as supplement No. 11:

Since the outbreak of foot-and-mouth disease in Mexico and the consequent threat of the introduction of the disease into the United States, in addition to all the protective measures that can be taken in the event of an outbreak of the disease in this country, considerable attention has been given to research on this disease by the United States Government. The desirability and need for research by the United States have been recognized by many segments of the livestock industry and professional groups. A Foot-and-Mouth Disease Research Advisory Committee appointed by the Bureau of Animal Industry, consisting of Dr. W. A. Hagan, Dean of the New York State Veterinary College at Cornell University; Dr. R. A. Kelser, Dean of the School of Veterinary Medicine, University of Pennsylvania; Dr. R. E. Shope of the Rockefeller Institute; and Dr. J. Traum, Professor of Veterinary Science, University of California, strongly recommends that a long-time research program be started by the United States and that it be conducted under the jurisdiction of the United States on United States territory, at some suitable location.

On January 26 and 27, the subcommittee on Foot-and-Mouth Disease of the House Committee on Agriculture held hearings to consider legislation to enable the department to conduct research in the United States or elsewhere on foot-and-mouth disease, and other animal diseases which in the opinion of the Secretary of Agriculture constitute a threat to the livestock industry of the United States. Two of those who made statements to the subcommittee were Dr. Bennett T. Simms, Chief of the Bureau of Animal Industry, and Dr. I. A. Galloway, Director of the British foot-and-mouth disease research institute at Pirbright, England. Other witnesses appeared, some favoring the legislation and others opposing it. Additional hearings will be held at a later date to be announced by the subcommittee.

Doctor Simms stated that two types of foot and mouth disease research should be undertaken: (1) research in established laboratories which can be begun at once and (2) a long range program in a specially constructed laboratory in continental United States to develop fundamental information pertaining to the disease. The discussion of these plans follows:

I. Research Which Is Being Undertaken Immediately

The immediate program is already set up under authority already granted. It consists of work in both Europe and Mexico. Qualified research men will be sent to laboratories engaged in foot-and-mouth disease research in England, Holland, Denmark, Switzerland, and possibly other countries. These men will engage in cooperative work with the investigators in the various institutions, and will also become familiar with the problems concerned with foot-and-mouth disease research and methods of procedure in the various institutions. In this investigational work, experimental animals, including cattle, swine, and guinea pigs, will be used, and the appropriate share of such expenses incurred, including special equipment used in this investigational work, will be paid by the United States Department of Agriculture. The work will cover:

1. Determination of the types of the viruses existing in Mexico through animal experimentation and serological means.
2. Methods of preparing vaccines from Mexican and European strains and the testing of such vaccines.
3. Studies on diagnostic procedures.
4. Chemical, physical, serological, and immunological investigation on viruses.

The Mexican phase of the immediate research program will include:

1. Tests in Mexican cattle of presently available European vaccines against Mexican virus.
2. The preparation of vaccines in Europe from Mexican strains of virus, and the experimental testing of such vaccines on Mexican cattle in Mexico.

II. Long-Range Research Program on Foot-and-Mouth Disease

The events of the past year, with respect to the spread of foot-and-mouth disease in Mexico, make it highly desirable and necessary that the Department establish a long-range research program covering all phases of the disease. No work has been initiated in this country in the past because the disease was not present, and because of the fear of possible spread of the disease if research work were carried on within the confines of the United States. However, the disease is now prevalent in an adjoining country, and therefore is a direct threat to our livestock industry. Furthermore, air travel has made it possible for persons to come to this country from any continent within a very short while. We have thus lost the protection of distance. Therefore, we should begin without delay a well-rounded research program that will supply us with the necessary information for protecting our livestock interests.

The establishment of research activities with foot-and-mouth disease within the borders of this country may give rise to misgivings because of the fear of possible spread of the disease from the base of such activities. The experience of British and other laboratories has demonstrated, however, that such research, if properly safeguarded, can be conducted without fear of spread. We believe furthermore that it is not practical to establish the base of research activities in a foreign country or on some isolated island off the coast. A location on United States

territory will insure complete control of the program by the Department.

Since foot-and-mouth disease is the most easily transmitted of all the infections which attack livestock the utmost precautions must be taken in any laboratory in which work with it is done. Specially designed buildings or quarters are necessary. We have set up certain criteria which we believe should be met in the location of facilities which will be used for research operations on foot-and-mouth disease. It is desirable that the laboratory be isolated as far as possible from contact with domestic and wild animals that may be susceptible to foot-and-mouth disease. It should be removed from as much human traffic as possible. It would also be desirable to locate this laboratory in close proximity to other medical research centers. We have done considerable exploring for suitable locations. Isolated islands, while having certain advantages, have one disadvantage in that a great amount of handling is required of any material needed in research and also presents a very serious problem from the standpoint of personnel. It would be difficult to recruit and retain a sufficient number of trustworthy workers in extreme isolation for any extended period. The importance of the project and the part that the personnel will play, not only in carrying out experimental work but also in taking the necessary steps to prevent the escape of the virus from its confines, are such that the personnel should be very carefully selected. Special provision should be made so that the proper type of worker is employed and that those endangering the safety of the project be summarily removed. Satisfactory arrangements to this end should be made with the Civil Service Commission at an early date.

The program undertaken at such a laboratory should include the following:

1. Fundamental research on the virus itself including its physical, chemical, and biological properties and its relations to other viruses.

2. Studies of modes of transmission including carrier animals, wildlife, etc.

3. Attempts at development of better diagnostic methods.

4. Studies of the different strains of the virus and their relations to one another.

5. Attempts to develop more effective and less expensive vaccines.

6. Efforts to develop more efficient methods of disinfecting contaminated premises and areas.

Hardly anything could emphasize more forcibly than Chief Simms' statement, the untimeliness of the USDA cocky news releases on the foot-and-mouth disease situation during the spring and summer of 1947. As early as May, when practically nothing was known of what would be required to handle the Mexican situation, it was proclaimed with a blare of trumpets that a decision had been reached "To try no 'cures' and to use no vaccines but to center all efforts on quarantine and slaughter." Associating vaccines, which have engaged the efforts of the best qualified experts on foot-and-mouth disease for years with quack "cures" suggested by untrained and irresponsible persons was a palpable expedient to override the Mexican representatives who were insistent upon vaccination.

Again official hand-outs stated "vaccines have no place in the campaign" and a decision "to exclude from the campaign vaccines, alleged cures or other treatments and to use only time tested methods of quarantine and slaughter that have fully demonstrated their effectiveness."

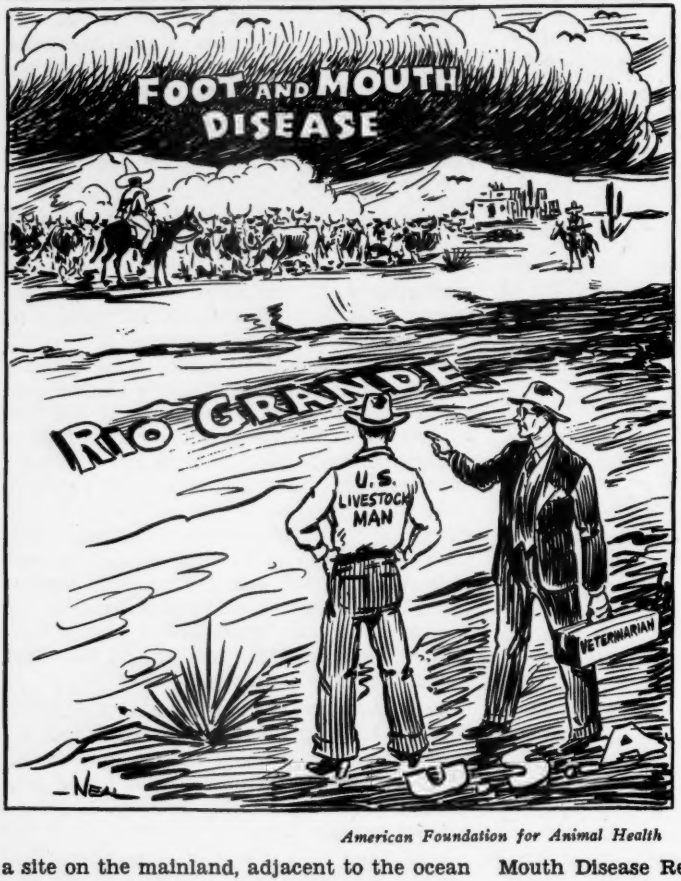
Ninety days later it was apparent measures "that have fully demonstrated their effectiveness" in one set of conditions may be wholly ineffective, when conditions are different. This should have been foreseen. It is inherent in all disease control. By this time it was felt the "no-vaccine policy" needed a lot of shoring, and again the trumpets were sounded and six specious reasons were given, why it was inadvisable to use vaccine. The sixth of those reasons has now come home to roost. It was: "Difficulty of keeping the highly infective virus from escaping from laboratories and spreading the disease among livestock." Now we are told that misgivings because of possible spread of the disease from such laboratories are unfounded. "The experience of the British and other laboratories" had demonstrated the same thing last August that they had in January of this year.

These matters are dwelt upon for the reason that the whole publicity campaign in connection with the outbreak of foot-and-mouth disease in Mexico was an affront to the veterinary profession of this country. It should not happen again.

It was not till the end of September, when the Mexican situation was bogged to the eyebrows, that any concern was manifested about obtaining more information about the disease and methods of handling it. Then representatives from this country and Mexico attended an international conference in Switzerland on the standardization of foot-and-mouth disease vaccines. Since then there have been no further releases linking "vaccines, alleged cures and other treatments," but an appropriation for a laboratory to manufacture vaccine is asked of the Congress.

The statement of Dr. I. A. Galloway, director of the British foot-and-mouth disease research, at the subcommittee hearing dealt mainly with the selection of a site for foot-and-mouth disease research. Doctor Galloway has had 25 years' experience in virus research and has visited all the foot-and-mouth disease research institutions. He strongly urged

"STORM BELOW THE BORDER"



American Foundation for Animal Health

The foot-and-mouth disease problem is not solely a problem of the Southwest. It is an equally serious threat to the dairy industry of Wisconsin, the Northeast, and the West Coast. It is a threat to hog producers of the corn belt and to the cattle feeders of the Middle West. It is a threat to every farmer in each of the 48 states, who owns a cloven-footed animal. It is also an economic threat to consumers as well as to business and industry everywhere. — Secretary Clinton P. Anderson, U. S. D. A.

a site on the mainland, adjacent to the ocean and near a large city where there is a university and divers research organizations. He regards a peninsula connected to the mainland by a narrow isthmus as ideal. The institution should provide many shelters and enclosures for cattle and small experimental animals. It should have laboratory facilities, a small meat cannery, and a laundry. The whole should be enclosed in a rat-proof fence. Living quarters should be for the personnel, with a school and means of diversion nearby.

The Pirbright research institution, of which Doctor Galloway is head, is situated 30 miles from London. There are several small dairy herds within one-half to two miles and a number of large dairy herds within a radius of five or six miles. In spite of this proximity of susceptible animals, there have been no outbreaks of foot-and-mouth disease due to escape of virus from the research center.

The selection of personnel for the Foot-and-Mouth Disease Research Advisory Committee could not be improved upon. All are experienced in research and all have been conspicuously successful in research projects which they have handled. Doctor Hagan has had a broad and varied experience including top rank experience in the Bureau. General Kelser is a recognized expert on viruses. His work with rinderpest virus, equine infectious anemia virus and rabies virus has been outstanding. Doctor Shope, too, is an expert on viruses. His trailing the virus of swine influenza till it was captured won international recognition. Doctor Traum has more years in research and more achievements to his credit, and in addition is one of the three best informed men in America on foot-and-mouth disease. More than a score of years ago Doctor Traum, with Dr. Harry Schoening and Peter Olitsky, M.D., spent a year in famous European research laboratories studying foot-and-mouth disease.

Diseases of the Nervous System

By W. J. GIBBONS, D.V.M., M. S.*
Auburn, Alabama

DISEASES of the central nervous system can be recognized only by the disturbed function of its parts. A physical examination of the diseased parts, by such direct methods of examination as are possible in the case of the thoracic and abdominal viscera, is out of question. Save for the optic nerve head which is visible in the fundus of the eye, the central nervous system is enclosed within the bony framework of the skull and vertebral column and is wholly removed from observation. Diagnosis, then, depends to a great extent upon the investigation and interpretation of disorders of function (symptoms) in tissues innervated by the central nervous system.

Two main factors are involved in neurological diagnosis, (1) the behavior from time to time of the pathological lesion and (2) its localization. Localization of functions in large animals is generally assumed from analogues in man, the dog, and experimental animals. In general it probably is the same. Few veterinary practitioners are in a position to attempt to localize brain lesions to a definite area but they should possess sufficient knowledge of the localization of functions to have an understanding of the function of the component parts of the brain and to be able to appreciate the symptoms or misfunctions.

The *hemispheres of the cerebrum* are the seat of physic functions of thought, feeling and will and contain the motor areas concerned principally with voluntary movements. Also in the cerebrum are centers of body sense which receive skin impulse, the sense of touch and temperature and impulses from the muscles and joints.

Disturbances of consciousness with varying degrees of excitement or depression are usually referrable to the hemispheres of the cerebrum. The cerebral motor cortex is involved usually in the various stages of *motor irritation* as denoted by spasms, tremors, muscular twitching and choreiform movements. Also associated here are (1) loss of voluntary movements; (2) increase of muscle tone: spasticity; (3) increase of tendon reflexes and clonus; (4) loss of cutaneous reflexes and (5) involuntary movements. Disturbances of consciousness and motor irritation are prominent symptoms in such diseases as rabies, encephalomyelitis, meningitis, various intoxications and poisonings, congestion of the brain, milk fever, listerellosis, and many other conditions.

*Professor, Department of Medicine and Surgery, Alabama Polytechnic Institute.

The *midbrain, pons and medulla oblongata* while part of the cerebrum have somewhat significantly different functions and for convenience can be considered collectively as having the supervision of many functions such as mastication, swallowing, sucking, vomiting, coughing, as well as centers of respiration, and regulation of the heartbeat. All the cranial nerves except the optic and olfactory arise from these parts. These centers are frequently involved during the course of diseases which affect the cerebrum.

The *cerebellum* is chiefly concerned with equilibrium of locomotion and body balance. In degeneration, or abscesses of the cerebellum consciousness may remain normal while the animal exhibits orthotonus, falling over backward, incoordination of gait and finally paralysis and death. Cerebellar ataxia is frequently manifested by eye movements (nystagmus), movements of legs, turning of the head and falling without any loss of sensation.

The *spinal cord* and *peripheral nerves* serve chiefly as transmission lines in carrying impulses to and from the brain. The spinal cord also contains reflex centers and centers for organs having involuntary musculature.

Disturbance of motility proper is manfested by paralysis or paresis and is caused by destructive lesions in the motor tract affecting the cerebral cortex, the motor pathways or the muscles and is frequent in animals. Central paralysis is caused by inflammation of the brain, tumors, concussions, blood clots, etc., while peripheral paralysis occurs in such diseases as botulism. Central paralysis or paresis may also be caused by toxemias of metritis, certain indigestions and milk fever and acetonemia. In cirrhosis of the liver, incoordination and progressive paralysis is common, leading sometimes to mistaken diagnoses of encephalomyelitis and toxic encephalitis.

Derangement of the Senses. Anesthesia, paresthesia, hyperesthesia, loss of sight and loss of hearing occur in such diseases as acetonemia, rabies, mad itch, and in spinal paraplegia.

In a paper of this description it is impossible to discuss more than a few of the diseases of the nervous system. I would, though, like to speak briefly of two diseases, (1) listerellosis or meningo-encephalitis of ruminants and (2) rabies.

Meningo-Encephalitis of Ruminants

Listerellosis (Circling Disease) is chiefly prevalent in eastern United States and the Midwest. In some sections of the country like in central New York it is the most frequent form of encephalitis. In cows the disease usually appears as a sporadic disease but some enzootics have been described. In the writer's experience the disease has a tendency to recur on farms where it has once been found, especially if the cattle owner also maintains a flock of sheep. In an incidence recorded by Poppensick, the organism was found in the aborted fetus of a ewe and typical "circling disease" was observed in a cow on the same farm 36 days later. The disease may be sporadic in sheep but frequently several are affected and even up to 10% of the flock may come down with the disease. Goats seem to be more susceptible than sheep and in one herd of 15 seven died of this disease.

The disease is caused by *Listerella* (Lysteria) *monosytogenes*. Listerellosis was first described as a specific bacterial disease of rabbits and guinea pigs (1926). With the passing years the organism has been isolated from many species of animals in the United States and foreign countries. Besides cattle, sheep, and goats it has been isolated from man, rabbits, pigs, swine, foxes, dogs, poultry, from the liver of a six-day-old foal, which died, and from racoon. In addition to causing nervous symptoms the organism is capable of causing septicemia due to necrotic foci in the liver and other organs and abortion or premature birth in several types of animals. Circling disease can be produced by intracerebral injection of the causative agent in the species ordinarily affected.

Symptoms in Cattle.—The disease is ushered in with dullness and refusal to eat or drink. There is a tendency to wander. In stanchioned animals, pushing and pressing forward is common. When released, the animal may stagger, fall or show incoordination. They have a tendency to circle constantly and may lean against or push against a wall or fence. Salivation may take place and sometimes there is monoplegia—paralysis of an eye, ear, or lip. Most animals show a moderate rise of temperature especially in the early stages.

Symptoms in Sheep.—There is dullness with a tendency of the affected animal to keep by itself or wander. The head is frequently held to one side or it may be retracted or held low. In most affected sheep there is not as much tendency to circle as in cows. Sheep frequently hold the head low and try to push the head under the fence, or under the sides of a pen. Lowered head and pushing in the corner of a pen is common. Monoplegia in the form of drooping of the lower lip or drooping of one ear is more common in sheep than in cattle. Somnolence and dummy-like symptoms are observed in some afflicted sheep. In one outbreak in goats paresis with orthotonus and spasms of the legs was characteristic.

Treatment.—The treatment of listerellosis has generally been considered hopeless although there are unpublished reports of recoveries in sheep treated with sulfanilamide and sulfathiazole. During the last two years cows have been cured with large doses of penicillin and the intravenous injection of 25% sulfamethazine.

Rabies

While listerellosis is an important disease of the nervous system in the Northeast and Midwest, its absence in the Southeast is more than replaced by the high incidence of rabies in cattle and other species of domestic animals in that section. The prevalence of rabies in the Southeast may be illustrated by statistics from the Georgia Department of Health. From January 1, 1942, until July 1, 1947, a total of 2142 dogs heads were examined and found positive. The heads of 484 foxes and other animals were positive on examination. During this same period 12,171 persons received antirabic treatment. Comparable figures might be cited from Alabama and most of the other southeastern states.

There are several interesting factors to be considered when one is practicing in an area where rabies is common, but the question of diagnosis is probably the most pertinent. There are times when the diagnosis of rabies depends entirely upon laboratory examination and even then at times a positive diagnosis may be uncertain. In my department we have adopted a policy of having all heads of animals examined, in which there may be even a possibility of rabies and in some of these animals the presence of the disease has been revealed by Negri bodies. When one of the instructors told a student that rabid animals, especially cows, could show everything or nothing, he was essentially correct. I was told by a veterinary pathologist that while making routine examinations of brains of soldiers that had died of encephalitis in the Burma-India theatre he found 14 positive for Negri bodies. The possibility of rabies had not been considered in these cases.

In discussing rabies the symptoms are usually divided into (1) a premonitory stage, (2) stage of excitement and (3) the paralytic stage. In cattle one may see all these stages

and the diagnosis is easy, but more frequently there may only be vague paralytic symptoms or nothing tangible which would indicate the disease. To illustrate the thought in mind I might mention some experiences with rabies.

Case 1.—A four-year-old Jersey cow, having been examined by a veterinarian who could not make a diagnosis, was brought to the clinic for consultation. The animal was off feed. The first day she charged a small dog that happened to pass in front of the animal. On the second day she pawed bedding but did not show any viciousness. On the fourth day she developed posterior paralysis and died in 24 hours. Examination at our laboratory and at the state health department laboratory failed to reveal Negri bodies. A rabbit inoculated with brain substance developed paralysis on the 17th day and died on the 18th day of rabies; Negri bodies being numerous. On the farm from which this cow came, two mules had become paralyzed and died two weeks previously. Autopsy revealed no significant lesions and poison was suspected. The brains were not examined.

Case 2.—A five-year-old, Jersey cow, one month after parturition, was suspected of having acetonemia because of nervousness. She became paralyzed and spastic at 48 hours and died the next day. Examination of the brain revealed Negri bodies.

Case 3.—The owner of about 70 grade beef cattle, kept in a woods pasture, had lost two cows and had three animals down unable to rise. The animals appeared bright and would eat and drink. Because of their poor condition the diagnosis was malnutrition. Eight more cows and one calf developed stiffening of the hind legs and a stilted gait. Three of them in going into deep branches to drink were unable to climb back out and stood in the water until dragged out or they fell down and drowned.

Paralysis would set in on the third or fourth day but the animals would continue to eat and drink until shortly before death. When handled in the paralytic stage there was some twitching of muscles and tetany of the legs. In all 13 cows and one calf died. Examination of the brains of those dying late in the outbreak revealed Negri bodies. Foxes were numerous in this area and were frequently seen in the daytime. Of all the animals that died none ever, as near as could be ascertained, showed any stage of excitement or tenesmus.

Case 4.—After I had examined a cow, with evident symptoms of rabies, one night, the owner asked for a diagnosis. When rabies was mentioned a commotion started and it was quite amusing to see five of his colored employees, two students and the owner all trying to get through a 2½ foot barn door at the same time.

Case 5.—One instructor requested a consultation on a cow which had refused feed for three days. The cow looked normal in every respect except for a bloody tail due to previous treatment for "hollow tail." When offered water from a pail she would wet her muzzle, refuse to drink, pull back the upper lip and then shiver.

My diagnosis of hydrophobia drew a good laugh, but the instructor didn't laugh two days later when the cow died and the brain was positive. He had had his hand down the cow's throat examing her for choke. As five months previous he had taken rabies vaccine and had considerable trouble, he decided to take three booster shots only. Six weeks have passed without incident.

Besides the diagnosis of rabies one of the most perplexing problems this disease presents is the question as to whether attendants, owners, the family which has drunk milk from the cow, students or the veterinarian should take the Pasteur treatment. Health officers and other doctors are inclined to throw this problem squarely into the lap of the veterinarian. A typical example was the instance of the group of cows previously mentioned where 14 died. Five negroes and the foreman had handled the cows and carcasses. When the negroes learned the diagnosis, there was considerable turmoil. The Southern negro, as a rule, has an abnormal fear of death in a manner he does not understand and considerable reassurance is sometimes necessary to keep them on a farm where rabies has existed. In this particular case the exposure was not positively established and inoculations were not advised.

Our experience in viewing the reactions from rabies immunization has been such that we hesitate to recommend Pasteur treatment unless a definite exposure can be established or it may be necessary on account of the mental attitude of the person who suspects he may have been exposed. In Georgia in 1946 *five* persons died of rabies while *eight* died after rabies vaccination.

Vaccination of large animals has not been advocated, after rabies appears on the farm, because of the expense and limitations of vaccination at that particular stage. This is carefully explained to the owner. When vaccination is desired we use one 50cc dose or two to three 25cc doses every three days. The last dosage is recommended where animals have been definitely exposed by a dog or fox bite.

Diagnosis of Foot-and-Mouth Disease

Comparatively few American veterinarians have a clinical acquaintance with foot-and-mouth disease. That is a satisfactory condition for which all can wish permanence. However, the outbreak of this disease across our southern border, which was announced in December, 1946, and has since steadily enhanced the threat to this country dramatizes "it can happen here." And if it does invade the United States the principal factor determining whether it is eradicated promptly, at little cost, or after delay at great cost will be the period that elapses between invasion and recognition. Livestock sanitary authorities in mid-western, southwestern and mountain states have matured plans for handling an outbreak *when it is* discovered. A few telegrams will suffice to establish quarantines, even strategic highway blocks, collect equipment, and mobilize veterinarians. Recognition of the disease will put the measures into effect within the hour.

If an outbreak of foot-and-mouth disease should occur in this country this year or next, or within the next five years, early recognition will, in all probability, depend upon the alertness of some practitioner; likely when upon a routine call. And the chances are it will be a practitioner who has not previously seen a case that will happen onto the first one. He will not have the benefit of animal inoculation nor an opportunity to see the disease in more than one species of animal. His responsibility will be great. That he may carry it with great confidence the following description of the symptoms and some of the other characteristics of foot-and-mouth disease are given. The following discussion is by a veterinarian who had a vast experience with the disease.

Nothing was known of foot-and-mouth disease in Great Britain before 1839, when it was first described in Norfolk. No disease of the lower animals has a wider distribution or a greater range of subjects susceptible to its attack. It, therefore, incidentally follows that the subject becomes of international importance from an economic point of view, and will bear repeated discussion by trained veterinarians and epizootiologists, in order that no point may be missed which will help in its control or eradication.

[1] Powley, J. O., M. R. C. V. S., Superintending Inspector, Veterinary Department, Ministry of Agriculture, Foot-and-Mouth Disease. Presented at 47th Annual Congress of the National Veterinary Medical Association of Great Britain and Ireland at Ayr, Scotland, Aug. 31-Sept. 6, 1929.

The Government's policy of slaughter emphasizes the importance of early and correct diagnosis, as delay of even an hour may mean the movement of animals discharging virus through our large distributing markets. Therefore, it behooves any practicing veterinarian or veterinary inspector who is called in to any suspected case immediately (in the case of the practitioner) to fulfill his legal obligations by reporting, and (in the case of the inspector) put into operation the Foot-and-Mouth Disease Order, and thus prevent movement, which will minimize the risk of market infection referred to above. After all, the principal cause of rapid and widespread infection is the movement of actually diseased or incubating animals.

When discussing with practitioners the question of the diagnosis of foot-and-mouth disease, I invariably describe it as a benign disease. By this is meant that in an ordinary uncomplicated case the diagnostic vesicles, particularly in the mouth, are thrown up suddenly, heal with great rapidity, and the constitutional disturbance is of a somewhat transient nature, as against a condition like malignant catarrh where the schneiderian and buccal mucous membranes are in a foul evil-smelling condition, and the malaise of a very decided and depressing nature.

Symptoms in Cattle

In the ox the symptoms of foot-and-mouth disease are as follows: At the commencement the animal is dull and inclined to stand still, with the head somewhat depressed, and the back arched. In some cases the hind feet are snatched up suddenly and shaken as if to get rid of something which annoys. The appetite is impaired, there is discharge of saliva, and between the digits, often on the outside of the coronet just above the hoof, and sometimes sometimes an increased secretion of tears which trickle down the sides of the face. In the milk cow, milk secretion is diminished at first. Frequently there is the characteristic mouth noise, which is more truly a suck than a smack. Some animals show uneasiness when standing, and paddle somewhat. When made to move the gait is like that of the proverbial "cat on hot bricks," with the animal well back on its haunches.

The temperature varies from 102° F. to 107° F. In a few hours after the first manifestation of symptoms of illness, vesicles filled with a limpid fluid may appear on the inside of the top lip, dorsum of the tongue, palate, teats,

on the bulbs of the heels. The mouth vesicles are generally few in number, of large size, situate on the dorsum of the tongue, and may be on both the hard and soft palates. One not infrequently meets with a case where the major portion of the mucous membrane of the tongue comes away in the hand. This is probably due to the formation of numerous small vesicles which have coalesced, with the consequent under-running of or exudation between the epithelium, causing it to become loosened and fall off, leaving the sensitive parts exposed. When examining cases of this type it frequently happens that the unfortunate animal will bellow with pain when the cold air impinges on the reddened sore left by the shedding of so much epithelium. Vesicles are sometimes seen on the muzzle and inside the anterior nares.

I have often noted, in the early stages of foot-and-mouth disease, before any appreciable vesicle formation, that the mouth has a pallid appearance. The unruptured vesicles stand out prominently and are well defined. When recently ruptured, the necrosed epithelium adheres as a ragged membrane for only a very short time; the underlying surface is decidedly red, and bleeds readily with manipulation. It is to be noted that the papillae are seldom entirely destroyed. Healing of these reddened surfaces commences immediately after rupture, and in the short space of three days the scar will show a uniform pearly gray covering of new epithelium. The healing process takes place from the centre as well as the sides of the sore. This rapid healing feature is one of the outstanding characteristics of buccal foot-and-mouth lesions as compared with other stomatitis conditions seen in this country. In Great Britain it may be as well to state that the disease seldom takes on the malignant form which it sometimes assumes on the Continent, and which was seen in Italy during the war.

Whilst the malady is not ordinarily fatal, an animal affected with it in the virulent form is a pitiable object. The amount of suffering endured is often excessive from partial separation of the hoof, and the extensive excorciations of the membranes of the tongue and mouth. A fact worth noting is that affected animals refuse all fluids, either hot or cold, up to the period of the decline of the malady. The foot lesions consist of true vesication, showing first either at the anterior or posterior border of the interdigital cleft, but as a rule running right through the cleft and implicating the bulbs of the heels. Rupture of these vesicles causes the discharge of a serous fluid, leaving a red, angry-looking sore with the epithelial covering of the late vesicle remaining attached to its edges as a ragged membrane. The ragged membrane eventually falls off during the first 12 to 24 hours.

Symptoms in Swine

In swine the lesions are confined principally to the feet. In a percentage of cases there is vesication of the snout and sometimes vesication of the tongue. Salivation is usually marked by its absence. In the sow the mammae are frequently the seat of innumerable vesicles. The gait of the affected pig is again that of the "cat on hot bricks," combined with a certain amount of resentment at being moved, as evidenced by the squeals. When investigating reported cases in hogs the history of many pigs lame on more than one foot should always arouse suspicion, and when this is accompanied by shedding of hoofs, one's diagnosis can be fairly certain. When the hoofs are not shed, which is usual, and healing of the vesicular sores has taken place, an appearance is produced which is typical of recovered foot-and-mouth disease, *viz.*, the condition known as "thimbling." By this is meant that the old hoof remains superimposed on the newly-forming hoof in the manner of a thimble. Once seen, the appearance is unmistakable. To one not conversant with this appearance there is great danger of not realizing its significance, and it is therefore important to make oneself acquainted with it. The question of diagnosis in swine raises a very important point, and one that should never be lost sight of *viz.*, that a percentage of initial outbreaks in this country originate in piggeries. These cases are sometimes not reported or perhaps not recognized until cattle begin to develop the disease. Meantime, incubating cattle and swine may have been moved through markets and been responsible for widespread outbreaks.

Symptoms in Sheep

In the sheep the principal seat of vesication is in the feet. One very diagnostic condition, when present, is vesication affecting the dental pad, which sloughs readily on the application of a little pressure. In no other disease of sheep does one get vesicle formation in the feet, so that evidence of an acute infective malady with vesication of the bulbs of the heels, and around the coronary band, is almost conclusive of foot-and-mouth disease. Combine with this the loss of the dental pad in a majority of the affected animals, and one's diagnosis is secure.

Shedding of the hoofs in sheep and swine is not an uncommon happening in foot-and-

mouth disease, and in the severer types of disease which occurred in this country about 1841 it is stated that basketfuls of hoofs of sheep and pigs were commonly collected on market days at Smithfield after the sale of animals was over. Newly-born calves and lambs suckling their dams suffering from foot-and-mouth disease, or fed on milk from such affected animals, not infrequently die suddenly from an acute toxemia without showing any lesions. In fact, it is not unusual for two-thirds of the total lambs born to die from this cause.

Internal Lesions

It is an interesting fact, and one which is not generally known, that vesicles form in some cases in the intestinal tract. Some years ago I made many post-mortem examinations on cows killed in the early stages of the disease, and repeatedly found thin-walled vesicles, particularly on the pillars of the rumen, and the mucous membrane of the small bowel. Another fact worth stating is the presence of vesicles in the endocardium, which are probably the cause of some of the fatal attacks of syncope seen in cows affected with foot-and-mouth disease.

Differential Diagnosis

Whilst on the question of symptoms, some remarks on vesicular stomatitis must be made, in view of the findings of the American and Continental research workers. The disease has been proved to be readily transferred to guinea-pigs, cattle, swine, and horses. It is a remarkable fact that in this country vesicular stomatitis, as described on the Continent, has not been recorded It is transmissible by contact to cattle and swine and is of such importance that I am taking the liberty of quoting fully the symptoms as described by Mohler, owing to the bearing it has on the question of differential diagnosis.

"The first phenomenon of vesicular stomatitis consists in the formation of reddened patches on the buccal mucosa, especially of the tongue. These are quickly succeeded by vesicles or blisters of greyish-red color, only slightly elevated, and of various sizes from that of a dime to that of a silver dollar filled with clear or yellowish serous fluid. These blisters may not be isolated, but frequently they coalesce to form a large vesicle. They usually rupture in a very short time, which accounts for their not being recognized at times even in the early stages of the disease. The rupture of the vesicles results in exposing the raw underlying surfaces, which appear as reddened erosions with the greyish-white fragments of the torn mucous membrane of the pre-existing vesicle still attached to the irregular borders like a fringe. These erosions may become confluent, varying from the size of a dime to that of the palm of the hand, and may even involve practically the entire upper surface of the tongue in horses.

"Healing varies, but usually occurs quite rapidly in from eight to fifteen days in uncomplicated cases. Whilst these lesions in horses are principally confined to the upper surface of the tongue, they may involve the inner surface of the lips, the angles of the mouth, and the gums. In cattle, on the other hand, the tongue does not appear to be so extensively affected, and lesions may also appear on the hard palate, lips, and gums, sometimes extending to the muzzle and around the nostrils. In a very few cases fresh cows have shown similar lesions on the teats when their infected calves have been sucking them, but no foot lesions have been observed in these cases. Immediately before, or simultaneously with the appearance of the vesicles there is present a moderate rise of temperature, which rapidly subsides. A more or less profuse flow of saliva follows, which dribbles from the lips and consists of a thin, stringy or frothy fluid. Not infrequently the presence of salivation is the first indication that the animal is sick.

"Owing to the painful condition of the mouth at this stage there is loss of appetite, or at least inability to eat, and in horses gritting of the teeth is quite frequent, while in cattle 'smacking' noises are heard as in foot-and-mouth disease. This sensitiveness as a rule remains for several days, after which healing commences, and it is remarkable to observe how quickly the sick animals will start to eat even while their tongues are still eroded. Although eating well, they do not regain their usual thrifty appearance for some time longer. In dairy cows, in addition to shrinkage in flesh there is a noticeable reduction in the normal flow of milk for a few days. So far as our observations are concerned, the period of incubation of vesicular stomatitis has varied from thirty-six hours to nine days, but the greatest number of cases have occurred in from two to five days after exposure."

It will be readily appreciated from the foregoing description that vesicular stomatitis in some of its phases must be clinically indistinguishable from foot-and-mouth disease. However, it is a remarkable thing that vesicular stomatitis, as described in America and on the Continent, has never been described as occurring in Great Britain, which means that

the disease described by Mohler either does not occur in this country or it has never been recognized.*

Viability of the Virus of Foot-and-Mouth Disease

Another factor which concerns us very much is the viability of the virus. The common impression is that the virus is easily destroyed, whereas certain facts have been proved which point to it being most resistant to destruction. Under certain conditions, *e.g.*, in 50% glycerol in the cold it lives indefinitely; under field conditions in hay and garden soil it has lived for 25 to 30 days, and American writers quote a case where virus persisted in the field for one year. Cow hair was one of the materials on which it survived for a month. A sample of marrow from a long bone, kept at freezing temperature, infected an ox by inoculation after 76 days.

Virus kept on ordinary dry hay and bran at atmospheric vapor pressure remained alive for two to five months. Combine these facts with the further astonishing fact that experimental disease can be produced with dilutions of virus of 1:10,000,000, and one can realize the difficulties attending its control and eradication.

Atypical Forms of the Disease

It is generally recognized that the period of incubation and severity of the experimentally-produced disease are proportional to the concentration of the virus, and this I am convinced applies equally to disease contracted under natural conditions. I am satisfied that some of the initial cases in this country are missed owing to the fact that the animal originally infected contracted disease in such a mild form as not to throw up what we regard as the typical diagnostic vesicles, but probably suffered only from a slight transient malaise. Such an animal, however, has transmitted the infection to several of its companions, which later threw up the typical vesicles.

To emphasize this point and also to show the difficulties attending diagnosis in some cases, I will quote two atypical cases which have come under my notice during the last few years. The first was a heifer showing a small vesicle at the bulb of the heel in each of two feet indistinguishable from a foot-and-mouth vesicle, with no fever, and no mouth lesions. Whilst feeling in my own mind that the case was one of foot-and-mouth disease, it was the fourth day before one of the contact animals showed disease in a typical form. On another occasion a cow was reported showing only slight vesication on the teats. Two days later a companion came down with typical lesions in mouth and feet. These two cases should also help to emphasize the great risk of spreading disease by attendants and veterinarians called in and not recognizing the suspicious character of the symptoms.

Modes of Entry of the Virus

The question of the modes of entry of virus into this country is a most important one, and difficult to solve. It is within the knowledge of most of the members of the Association that the Minister of Agriculture prohibited the entry into this country of continental pig carcasses. These were known in the trade as "hair carcasses," meaning that the pigs were killed on the continent, simply eviscerated, and the eviscerated carcasses shipped to this country to be converted into so-called Ayrshire bacon. It was conclusively proved, despite the contradictions of some of the continental authorities, that these carcasses were conveying foot-and-mouth disease to this country. In one Lancashire outbreak last year the owner with a small stock of pigs and cattle used every week to purchase from a Liverpool butcher a quantity of fresh long bones, a proportion of which were certainly from South American beef carcasses. These bones were taken direct to the farm, put through a small bone cutting mill on the farm, and the meal or cuttings collected in a bucket and fed direct to the poultry. The same bucket was then used without washing, to feed the pigs, and in some cases to carry water to the cattle. When disease was confirmed on the premises several cattle were affected, but the oldest lesions were found in the pigs, in which animals the disease undoubtedly started and was transmitted to the cattle. Foot-and-mouth disease not infrequently breaks out in this poultry-raising district, but it is seldom that one can get such a clear-cut circumstantial evidence of origin as the one quoted.

Considering the question of South American products, one needs just think of the amount of wheat pollards and other cattle foods being shipped to this country to realize that a certain amount of risk must be run, especially when their method of transport is considered. These materials are frequently carried in old Argentine sacks packed in the ship's hold in contact with hides (dry and salted), without mentioning many other meat products and commodities which may contain infective material. An explanation is frequently sought for the increase in the numbers of initial out-

*It will be remembered this article was written in 1929.

breaks in this country during recent years, but when one considers the amount of disease on the Continent and in South America, combined with the greatly increased facilities for trade between Great Britain and these continents, the wonder is that we should at times be so free.

Pitfalls in Labeling Veterinary Medicines

The Food and Drug Administration regards section 201 (n) of the Act important in determining whether a veterinary medicinal is misbranded because its labeling fails to reveal material facts in the case. A good example for consideration under this section is a coccidiostatic agent for poultry, or sheep, or swine. It is more or less limited in value to the prevention or control of an outbreak of coccidiosis and cannot be regarded as a treatment or cure for those birds, or animals already showing symptoms of the infection. If the label fails to reveal these material facts it is misleading.

Another example is that of an anthelmintic which is only partially effective for the removal of certain species of worms. This is a material fact which should be clearly set forth in the labeling. The labeling of any medicinal preparation having a substantial degree of efficacy in the prevention or treatment of any specific disease condition needs no qualifying statement in this respect, however.

In considering a brand name for a medicinal preparation containing two or more active ingredients, attention should be given to regulation (b) under section 502 (a) of the Act which deems the labeling of a drug to be misleading by reason (among other reasons) of the designation of such drug, in such labeling, by a name which includes or suggests the name of one or more but not all such ingredients even though the names of all such ingredients are stated elsewhere in the labeling.

In the preparation of the label or labeling, due consideration should be given also to section 502 (c) of the Act which deems a drug or device to be misbranded if any word, statement or other information required by or under authority of the Act to appear on the label or labeling is not prominently placed thereon with such conspicuousness (as compared with other words, statements, designs or devices in the labeling) and in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

Manufacturers of veterinary medicinal preparations sometimes fail to give proper consideration to section 502 (e) (2) of the Act which makes it mandatory to declare on the label the common or usual name of each active ingredient including the name and quantity or proportion of certain drugs specifically mentioned in this section of the Act. If any ingredient in a formula is not furnished in therapeutically significant amounts in the daily dose, it is obviously not an active ingredient and listing such an ingredient under the heading "active ingredients" or in any way suggesting or implying that it is active is, in the opinion of the Administration, misleading. If, however, the formula contains any drug specifically designated in this section of the Act, for example, strychnine, its quantity or proportion in the product must be declared whether active or not. Otherwise, the inert ingredients are not required to be declared on the label. There is, of course, no objection to declaring the inert ingredients if they are properly designated under such a heading. Many irrational formulas of veterinary medicinal preparations do not furnish *any* ingredient in therapeutically significant amounts, because they are unscientific mixtures of many different alleged therapeutic agents having dissimilar activity furnished in amounts so insignificant as to render them all inert. Under such circumstances, we are at a loss to know how any labeling, which complies with the intent and purpose of the Act, can be drafted for the article.

Since coloring agents are frequently used in the manufacture of veterinary medicinal preparations, it should be borne in mind that the Act prohibits the use of any coal tar preparation for coloring drugs unless it is obtained from a batch certified by the Food and Drug Administration as provided by the Act.

Under section 502 (f) of the Act the labeling must bear adequate directions for use and adequate warnings against misuse. I believe most of us fully appreciate that directions for use cannot be regarded as adequate when the label or labeling fails to state the specific purpose for following the directions on the labeling. If a preparation serves no useful purpose in the prevention or treatment of any disease condition of any species of animal adequate directions cannot, in our opinion, be prepared in compliance with this section of the Act. Warnings against misuse are frequently of such importance that it may be necessary to present them prominently on the main panel of the label as well as in the directions for use to comply with section 502 (c) of the Act.

Survival of Sheep Nematode Larvae on Pasture During Summer*

By E. R. DOLL, B.S., M.A., D.V.M.**
and F. E. HULL, D.V.M.**
Lexington, Kentucky

ROTATION of pastures for grazing animals has received the attention of numerous investigators over a period of several years and has been recommended generally as a measure for control of internal parasites. In order to determine the safety for grazing sheep in the spring, considerable investigation has been directed toward the overwinter survival of parasite larvae and eggs. It is also desirable to have information on survival of eggs and larvae during the summer months, particularly through mid-summer, when permanent bluegrass pastures are grazed down and growth has been interrupted by the hot and dry weather common in the mid-western states. It is during this period that temporary pasture crops are most useful and concurrent animal rotation can be practiced most easily.

At Beltsville, Maryland, Dinaburg[1] could not recover infective larvae of *Haemonchus contortus* from grass plots after 98 days of exposure from March 20 to June 6, and 50 days' exposure from July 5 to August 14. In California, Furman[2] observed rapid destruction of larvae of *Ostertagia circumcincta* on non-irrigated pastures during summer. At Weybridge, England, Taylor[3] was unable to recover "trichostrongyloid larvae of ovine origin" after 133 days' exposure. Shorb[4] observed rapid destruction of eggs and larvae over an 18-day period during July at Beltsville, Maryland. In a series of three experiments using parasite-free lambs to test infectivity of the pasture, Shorb[5] observed that only *Trichuris ovis* survived exposure periods of two, 3.5 and four months during midsummer and early fall. All of the common parasitic larvae of importance in sheep were present on the pasture.

Methods

The experiments were designed to test the viability of larvae of the common nematode parasites of sheep on pasture during the summer months. The months selected for the test period were July, August, and September. Trials were performed during three consecutive years; 1945, 1946, and 1947. All trials were performed on plots of permanent pasture measuring 10x20 feet and situated within a 0.1-acre area. The herbage was Kentucky blue grass, white clover, and wild grasses, and was clipped at a height of 2.5 to three inches at intervals throughout the test period. Clippings were left on the plots.

In each year sheep had access to the lot for several weeks before the experiment was begun. Further contamination was accomplished by scattering approximately two gallons of fresh sheep manure on the 10x20 feet plots daily. Egg counts on the feces varied between 100 and 500 eggs per gram. The daily application of feces was made from June 16 to 30 inclusive for single plots in the years of 1945, 1946, and 1947. In 1945 a plot was similarly contaminated from June 1 to 15 inclusive. The plots were closed to habitation by animals from July 1 to October 1, when they were tested for infectivity by grazing with parasite-free lambs. In 1945 two lambs were used for each plot. In 1946 only one lamb was available for the test, and in 1947 three lambs were used.

The lambs used in these trials were separated from the ewes at birth and raised by hand on cow's milk. They were quartered in an indoor enclosure on concrete floors bedded with straw which was replaced twice weekly. The feed consisted of alfalfa hay, mixed hay, and a mixed grain ration. Repeated fecal examinations by salt and sugar flotation methods throughout the holding period failed to show the presence of parasites other than coccidia.

The lambs were placed on the test plots on October 1 and permitted to graze 10 days to two weeks. In this period, all forage on the plots had been consumed, leaving the ground bare. The lambs were then removed to indoor bedded pens and held for three weeks before being slaughtered and examined for parasites. Examination was conducted by washing the contents of the stomach, small intestine, and large intestine in 60 and 80-mesh sieves in series before examining for parasites. Pooled samples from the ewes used to supply feces for contamination of the plots were examined by fecal culture to estimate the approximate number of species being passed. The parasite burden appeared essentially the same in the

*The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

**Department of Animal Pathology, Kentucky Agricultural Experiment Station.

TABLE I.—TEMPERATURE AND RAINFALL DURING THE EXPERIMENTS*

	Mean temperature Degrees F			Maximum mean temperature Degrees F			Minimum mean temperature Degrees F			Precipitation total inches		
Year	1945	1946	1947	1945	1946	1947	1945	1946	1947	1945	1946	1947
June	69.8	72.3	70.4	79.5	81.9	80.0	60.1	62.7	60.7	7.03	5.33	5.15
July	74.0	74.8	70.0	84.7	85.2	80.0	63.3	64.5	60.0	4.63	5.84	3.01
August	74.6	69.3	79.0	86.1	79.3	89.2	63.2	59.3	68.9	1.55	3.60	2.88
September	71.8	68.4	68.2	82.6	79.8	79.4	61.1	57.0	57.0	1.61	3.14	2.65
October	56.1	59.6	63.6	67.1	71.6	74.7	45.2	47.5	52.5	1.67	1.84	2.79

*Weather data were obtained through courtesy of the Weather Bureau, Lexington, Ky.

ewes for each of the three years. Approximately 50% of the larvae from fecal cultures were *Haemonchus contortus*, 30% *Strongyloides papillosus*, and the remaining 20% nearly evenly divided among *Ostertagia* spp., *Trichostrongylus* spp., *Cooperia* spp., *Nematodirus* spp., and *Oesophagostomum* spp.

Results

The two experiments for the year of 1945 have been summarized previously.[6] For this year one plot was exposed for three months, from July 1 to October 1 and grazed by two parasite-free lambs from October 1 to 15. Another plot was exposed for 3.5 months, from June 16 to October 1 and grazed by two parasite free lambs during the same period, with two *Nematodirus* spp. being recovered at three weeks after the grazing period. From two lambs grazing on the plot with three months exposure, six *Nematodirus* spp., 17 *Ostertagia* spp. and four *H. contortus* were recovered.

The one lamb available for testing the plot exposed for three months; July, August, and September of 1946 failed to acquire any infection during the two weeks grazing period of October 1 to 15. Nematode parasite infection was also absent from three lambs used for a corresponding test period for the 1947 season.

Nematode ova could not be found in the feces of lambs on which examination for adult worms was negative at any time between the end of the grazing period and the time of slaughtering.

TABLE II.—NEMATODE PARASITES FOUND IN THE LAMBS AT THE END OF THE TEST PERIOD
Numbers of worms found in lambs at end of exposure period

	1945	1945	1946	1947
H. contortus	0	4	0	0
S. papillosus	0	0	0	0
Ostertagia spp.	0	17	0	0
Trichostrongylus spp.	0	0	0	0
Cooperia spp.	0	0	0	0
Nematodirus spp.	2	6	0	0
Oesophagostomum spp.	0	0	0	0
Exposure period of larvae on pasture	June 15 to October 1	July 1 to October 1	July 1 to October 1	July 1 to October 1
Number of lambs grazing the plots	2	2	1	3

Summary

A few infective larvae of *Nematodirus* spp. survived for a period of 3.5 months from June 15 to October 1. A small number of *Haemonchus contortus* and *Ostertagia* spp. survived for three months from July 1 to October 1 during the 1945 season. *Strongyloides papillosus, Trichostrongylus* spp., *Cooperia* spp., and *Oesophagostomum* spp. apparently failed to survive during the period.

There was no survival of infective larvae in an exposure period of three months from July 1 to October 1 during the seasons of 1946 and 1947.

References

1. Dinaburg, A. G. The survival of the infective larvae of the common ruminant stomach worm, *Haemonchus contortus*, on outdoor grass plots. *Am. J. Vet. Res.*, 5, pp. 32-37. 1944.

2. Furman, D. P. Effects of environment upon the free living stages of *O. circumcincta* (Stadelman) Trichostrongyloidae. II. Field experiments. *Am. J. Vet. Res.*, 5, pp. 147-153. 1944.

3. Taylor, E. L. Observations on the bionomics of strongyloid larvae in pastures. I. The duration of infection in pasture herbage. *Vet. Rec.*, 50, pp. 1265-1272. 1938.

4. Shorb, D. A. Survival on grass plots of eggs and preinfective larvae of the common sheep stomach worm, *Haemonchus contortus*. *J. Parasitol.*, 29, pp. 284-289. 1943.

5. Shorb, D. A. Survival of sheep nematodes in pasture. *J. Agr. Res.*, 65, pp. 329-337.

6. Doll, E. R., and Hull, F. E. Survival of nematode parasites of sheep on pasture during summer. Ky. Agr. Exp. Sta. Bul. 482. 1946.

Veterinary Education in Formosa and Japan

By JOHN W. PATTON, M.S., D.V.M.
East Lansing, Michigan

IN November, 1946, I left the United States by plane for the Orient. Being in the employ of UNRRA my destination was the Oriental headquarters of that organization, in Shanghai, China. Soon after my arrival I was sent to Formosa to rehabilitate the veterinary program which had been inactive since VJ Day. There were several Chinese army veterinarians on the Islands, but they had no scientific veterinary training nor any scientific knowledge whatsoever and, if possible, they had even less inclination to work. As a consequence we were not molested in our work.

The object of this article is a description, in some detail, of the Japanese system of veterinary education, which is essentially the Formosa system also. Since certain features of the Formosa veterinary service will be cited to illustrate the subject, a brief description of Formosa, its people and its history may be useful.

Formosa or Taiwan, as it is known in the Orient, was known in the Sui dynasty as Ryukiu. In the sixteenth century the Japanese called it Takasago. Later the Portugese named the island Ilha Formosa—"Island Beautiful." The Orient knows it as Taiwan, and the Western World as Formosa. To a westerner the Portuguese name seems most appropriate, for it is a beautiful island.

Taiwan (Formosa) has an area of approximately 14,000 square miles (one half the area of Scotland, or combined area of Vermont and Connecticut). It consists of the main island, some 64 small island in the Pescadores, and a dozen or more small islands off the coast. The main island is about 264 miles in length, 80 miles wide at its widest point, and is leaf-shaped. The Tropic of Cancer bisects it into two climatic regions: the north, temperate and the south, tropical. Due to the monsoons, rain visits the north in the summer; the south in the winter. In the north the city of Kelung is the third rainiest spot on earth; the average annual rainfall being 200 inches and it rains on 219 days. Formosa is a land of high mountains and short rivers, one of the mountains (Mt. Niitaka) has a height of 13,075 feet, (within 1000 feet of the height of Pike's Peak). Some 48 of the mountains are more than 10,000 feet high. It is not unusual to travel in the tropical southern portion and view snow-topped peaks.

Formosa has a population (1943) of 6½ million of which 400,000 are Japanese and Koreans, and the remainder natives plus a handful of Westerners. Among the natives are 160,000 Aborigines divided into two classes: uncivilized and semi-civilized. The former live in the fastness of the mountains and still practice head hunting; the latter intermingle with the Chinese whose form of living they have adopted.

Agriculturally, Formosa produces more than she consumes! The farming population (1943) exceeded 3¼ million, or 50% of the total population. The area tilled per farming household equalled 1.87 ko, or approximately four acres of which 69% was paddy and 31% upland. The total number of livestock reached its peak in 1943—1,670,000, of which 1,270,000 were swine and 320,000 were cattle. Ducks and chickens are raised in great numbers. The beasts-of-burden are the water buffalo and yellow cattle. Horses do not exceed 100 in number, other than those on the horse breeding farm formerly maintained by the Japanese cavalry. The Island is densely forested; 61% of the entire area. This, together with the mountainous nature of the island, makes for a denseness of agricultural endeavor; thus, every available spot is utilized.

Rice, as expected, is the main crop and consists of two plantations in the north and three in the south. Half of the crop is exported to Japan. The principal crops following rice are sweet potatoes, sugar cane, tea, peanuts, soya beans, bananas, pineapple, oranges, tobacco, jute, ramie, and a number of other tropical fruits are grown. There is an abundance of edible, mostly excellent, fish. Formosa exports much of the foregoing and also great quantities of coal. Among other things the Island is noted, also, for camphor and coral.

Formosa is a close second to Japan in having the lowest rate of illiteracy in the orient or pretty much anywhere else. Numerically speaking, one out of five of the total population is attending primary school. The local governments in hsien and municipalities sometimes spend as much as 48% of their entire budget for education, and seldom less than 25%. Hydro-electric power is cheap and abundant; 50% of the households being wired for electricity and this includes farm homes. The rate is, or was, the equivalent of approximately 2c in United States currency per kilowatt hour.

Few foreigners have had an opportunity to know much about Formosa, for few, even

Asiatics, were permitted to visit the island. During the 51-year Japanese reign they converted the naturally beautiful land into a relatively modern one. Its Capitol, Taipei, is said to be the most modern and beautiful in all Asia. The telephone system in Taipei, for instance, was almost as large and more modern than the one in Shanghai. Its airfields are the best in the Orient. It is precisely what one would expect the Japanese to have in an island chosen as a spearhead for their grandiose idea of Asiatic conquest.

From a veterinarian's point of view it was, and is, as different from China as day from night.

During the Japanese regime Formosa had a veterinary college as a part of Taihoku Imperial University, which was on a par with the Imperial University of Tokyo. There were in addition several secondary veterinary institutions. Graduates of outstanding ability from the latter were often sent to either the Taihoku University or the Imperial University in Tokyo for further training. The key veterinary positions in Formosa were, naturally, presided over by the University graduates with the college and secondary school graduates acting as technicians — and amazingly capable technicians they were. There was an active veterinary association on the Island with a membership of more than 500 veterinarians. Each hsien (county) and municipality had on its staff a number of veterinarians as had the various agricultural and secondary schools. In short there was an abundance of relatively capable native veterinarians, presided over by well-trained Japanese University graduates. I was favorably impressed with the Japanese veterinarians I met and with whom I was associated. I am inclined to think that the Japanese army veterinarians of whom our own army veterinarians formed a very poor opinion must have been graduates of the lesser Japanese veterinary schools; not university graduates of whom there could not have been a sufficient number to go very far in supplying the army.

The common animal diseases were hog cholera—by far the most important numerically—swine plague, fowl cholera, fowl pest, pullorum disease, anthrax, black-leg, rabies, infectious anemia, piroplasmosis and trypanosomiasis. Rinderpest had been eradicated from the island.

Under the Japanese these diseases were kept well under control and most of them had reached their lowest point in the early 1940's only to rise again during the latter stages of the war. Some of them got almost out of hand after V-J Day. The control of animal disease in Formosa was a good example of the value of a capable veterinary service and a strict enforcement of quarantine. When it came to quarantine the Japanese did no fooling, neither did anyone else.

It was my task to rehabilitate the Formosa veterinary service, to reopen the veterinary college at the university, to establish quarantines, to instruct Formosan veterinarians in western methods of disease control and get the biological manufacturing plants functioning again. We had some success in rehabilitating the veterinary service.

The reopening of the veterinary college is a matter of finance and will take time. Quarantine stations which had been bombed out were reopened. By short courses and conferences and personal visits instruction was given in disease control. The once excellent biological manufacturing plant at Tamsui was rebuilt, after most severe bomb damage, and was functioning when I left. Here again there was money for buildings but none for personnel and equipment. But why go to the trouble and expense of manufacturing biologics when the United Nations are more than willing to furnish all they need, or even think they need? The bottle neck was personnel. With the key veterinarians sent back to Japan and the native veterinarians with no experience beyond doing as they were told to do and the Chinese, what they call veterinarians in charge, the crying need was for a dozen or more American trained Chinese veterinarians to carry on where the Japanese left off. But China does not have them and if she had it would be difficult to get them to go to a land where the natives remark "the Americans were charitable to the Japanese they only dropped atomic bombs on them while they dropped the Chinese on us." From a veterinary point of view salvation can come only by filling the key positions left vacant by returning Japanese veterinarians by Formosans trained in the universities of Japan.

By the following account it will be noted oriental veterinary education differs greatly from that of western nations, yet has incorporated some western principles and methods, particularly is this true of German veterinary education.

Professor Yamane, who wrote this article at my suggestion, writes excellent English and speaks it with facility. I think it is worthy of note that he a veterinarian was selected for Professor of Animal Husbandry in the Taihoku Imperial University at a time when veterinary medicine was not taught there. I saw many things to indicate that the Japanese placed a high value on veterinary science.

VETERINARY SHORT COURSE AT TAIHOKU IMPERIAL UNIVERSITY, FORMOSA

The man seated in the center is the president of the University. On his left (honor position in Japan) sits Dr. J. W. Patton (in light suit). On the president's right sits Dr. J. Yamane, author of the article on veterinary education which follows. The others seated are faculty members. On Professor Yamane's right sits Professor Dr. Sigumoto, parasitologist, and on his right Professor Dr. Liu, bacteriologist, a Formosan trained, like most of the others, at the Imperial University, in Tokyo. At the extreme left, seated, is Jimmy Wu, a Chinese animal husbandry graduate of Iowa State College at Ames.

This short course was an invitation affair, limited to one representative from each municipality, one from each hsien (county) and one from each branch of veterinary endeavor. Just as the veterinary short course got under way, a revolution broke out and Chinese soldiers had great sport loitering about the campus and shooting at students. No veterinary students were molested. This was supposed to have been (and I think correctly) by direct order of the Governor General, who expressed himself as being much pleased with the short course and desirous of having more of them held. We used four languages in the short course, Japanese, Taiwanese, Chinese and English. All who completed the course were given diplomas.

Other short courses—one for food inspectors and another for sanitary employees—were planned and approved, but the outbreak of the revolution occasioned their postponement beyond the date of my departure.

The Japanese system of veterinary education resembles the Russian in one important respect—three grades of veterinarians are produced by it—(1) assistants to veterinary practitioners (correspond to the graduates of a one-year course in the USSR), (2) practitioners (correspond to the graduates of a three-year course in USSR) and (3) university graduates, who do the research, fill the higher governmental and college positions (also are district supervisors of practitioners in the USSR).

The Japanese (and Formosan) school system comprises (1) primary schools, (2) middle schools, (3) higher schools and (4) universities. In the opinion of Professor Yamane, the primary schools correspond to the grade schools in this country, the middle schools to our high schools, the higher schools to our colleges and the universities to our graduate schools. I was not in Japan, but from what I saw of Taihoku Imperial University, now Taiwan National University, I should place the higher schools on a plane with our junior colleges and rate the middle school and the university, respectively, immediately below and above that.

In conclusion I recommend careful reading of the following article by Professor Yamane.

A Veterinary Education in Japan

By DR. J. YAMANE
Professor of Animal Husbandry,
National Taiwan University,
Taipei, Taiwan (Formosa)

A short explanation of veterinary education in Japan generally precedes that of Taiwan. Since the latter was derived from the Japanese system, it is more readily understood when described in this way.

It is needless to say that educational systems of various nations differ in accordance with differences of their respective environment. In this Japan is not an exception. Her veterinary education has experienced various reorganizations due to changes in the standard of living of the nation, changes in national and social demands for veterinarians, and changes consequent upon transition of periods.

In the past veterinary education in Japan was maintained for the following three purposes:

1. University education. Theory and technic which were indispensable to veterinarians of the highest level, researchers, and leaders in governmental institutions.

2. Higher School education. Required technic being given for a short duration, those who were to be assistants to the personnel mentioned in (1).

3. Middle School education. Assistants to University and Higher School graduates were trained here. They were also educated with a view to reinforce the inadequate number of veterinarians in a transition period.

I. University Education

1. *Admission.* There are, generally speaking, two classes of students who are qualified to apply for admission to the universities:

(1) Graduates from the *Koto-Gakko,* or higher schools.

(2) Those who have passed satisfactorily the examination given by the Faculty concerned and proved themselves to be equal in attainments to the above mentioned graduates.

The graduates from the higher schools take precedence of other applicants, in their respective lines of study.

The student enters a higher school—that is, if he is so fortunate as to pass the rather severe entrance examination—at about the age of 17, after leaving the middle school, which he finishes usually in five years. The higher school is divided into two main divisions, or departments, namely Literary Course and Science Course; the period of study is three years in both divisions.

Thus the student comes to the university after having had, in one of the two divisions of the higher school, ample intellectual training of a kind somewhat similar to that obtained in colleges or preparatory schools in the Western countries.

Unfortunately, however, under the existing circumstances, not all of the graduates of these higher schools can be admitted to the Universities, on account of the present limited capacity of the latter.

The university education is three-year course in every division, except medicine which takes four years.

2. *Degrees.* The system of degrees distinguishes two grades—*Gakushi* (somewhat corresponding to the master's degree) and *Hakushi* (the doctor's degree). The prefix to the title varies according to faculty or department, *i.e.,* Nogakushi (Master of Agriculture). Nogakuhakushi (Doctor of Agriculture), Igakushi (Master of Medicine), Ikakuhakushi (Doctor of Medicine), etc. Thus Jyuigakushi may be rendered "Master of Veterinary Science" and Jyuigakuhakushi "Doctor of Veterinary Science." The degree *Hakushi* is granted to those who, being *Gakushi* or its equivalent, have successfully pursued their research work in the post-graduate course and fulfilled the requirements as stated in the paragraph on the "graduate students," or those who have proved themselves competent scholars by presenting acceptable theses.

3. *Veterinary education.* University veterinary education is undertaken by the Tokyo Imperial University and the Hokkaido Imperial University. In either of these two universities the veterinary section is established as a division of the Faculty of Agriculture. In the Tokyo Imperial University the number of graduates from the veterinary section from 1880 to 1940 amounted to 600 in total. In the Hokkaido Imperial University the graduates of 1913-1940 numbered about 250. Since 1930, however, animal husbandry, especially horse breeding and dairy production, of Japan have been on the up-grade and the number of applicants increased proportionally—every year 25 or 30 men graduating from Tokyo and 10 from Hokkaido.

In the Tokyo University the graduates were given the degree Master of Veterinary Science at first. But 20 years ago the title was abol-

ished and the degree Master of Agriculture conferred upon them just as upon graduates of other divisions of the Faculty of agriculture have been called. The degree, Doctor of Veterinary Science, was also dropped at that time and Doctor of Agriculture replaced it. In the Hokkaido Imperial University the graduates have always received the degree in Agriculture.

II. Higher School Education

The veterinary higher schools receive the graduates of Middle Schools or agricultural schools of the secondary educational level, who have passed the entrance examination.

The earliest establishment of this kind was the Veterinarians' Training Section attached to the Veterinary Section of the Tokyo Imperial University. From 1901 to 1936 about 847 men were graduated from the Training Section. The section was renamed as the Veterinary Section of the Tokyo Higher School of Agriculture and Forestry in 1938 and has graduated 50 annually since then.

The second oldest is the Veterinary Section of the Morioka Higher School of Agriculture and Forestry. Since 1906 when the first graduate left it about 800 men finished the course there up to the second world war.

Later, responding to the demand for veterinarians, higher educational institutions, both public and private, were newly set up. Prior to the second World War there were nine governmental veterinary higher schools and three private veterinary higher schools. They are as follows:

1. The Veterinary Section of the Morioka Higher School of Agriculture and Forestry.
2. The Veterinary Section of the Tokyo Higher School of Agriculture and Forestry.
3. The Veterinary Section of the Tottori Higher School of Agriculture and Forestry.
4. The Veterinary Section of the Utsunomiya Higher School of Agriculture and Forestry.
5. The Veterinary Section of the Miyazaki Higher School of Agriculture and Forestry.
6. The Veterinary Section of the Gifu Higher School of Agriculture and Forestry.
7. The Veterinary Section of the Kagoshima Higher School of Agriculture and Forestry.
8. The Veterinary Section of the Miye Higher School of Agriculture and Forestry.
9. The Obihiro Higher Veterinary School.
10. The Azabu Veterinary Science and Animal Husbandry Higher School (private).
11. The Tokyo Higher Veterinary School (private).
12. The Nippon Higher Veterinary School (private).

Those Higher Schools each sent out 30 to 50 graduates yearly at first, but on the outbreak of the World War II the government schools doubled their enrollment.

III. Middle School Education

Those who had finished the six-year course of the elementary school and had passed the entrance examination were allowed to receive the secondary veterinary education which consisted of a three-year course. This veterinary education was undertaken by a division of a provincial agricultural school. Its graduates were given a veterinarian's license, issued by the Department of Agriculture and Forestry, the same one as that given to the recipients of Universities and Higher Schools. The graduate usually got a position in the capacity of a public or governmental official. He was the most active member of this field.

However, since veterinary education cannot be complete without receiving higher educational courses, the middle school education was discontinued; and higher veterinary education enjoyed expansion. Thus the veterinary section of the provincial agricultural school was revamped in 1936 as the animal husbandry section.

During the second World War, however, demand for veterinarians increased so rapidly, this once abandoned system was revived. In this case, however, the trainees were not granted the same veterinary license as those accorded to University and Higher School graduates, but were given a certificate as veterinary aid. Presumably this emergency measure will be discontinued.

B. Veterinary Education in Taiwan

I. Secondary Veterinary Education

Veterinary education in Taiwan can be said to have come into existence in 1906. At that time animal diseases, such as rinderpest and hog cholera, were rampant in the Island and the animal industry suffered great losses from them. In view of this state the Government-General of Taiwan opened a six-month instruction course on veterinary technic at the Government Agricultural Experiment Station at Taipeh. Up to 1911 the recipients of this short period of training numbered 65. In 1912 the level of the instruction was raised; a one-year preparatory course and a three-year veterinary course being given. Mainly only those were trained who would be engaged in treatment of animal disease. The training lasted until the eighth graduating class left the institution; the total number of the alumni was nearly 130 men.

Nevertheless, since the demand for veter-

inary service was not satisfied by low standard education, veterinary sections were set up, following establishment of agricultural schools of the secondary education level: a new five-year course, veterinary section was added to each of the two schools, the Heito Agricultural School, which was founded in 1928, and the Tainan Agricultural School, founded in 1939; the former has graduated 420 and the latter, 100, up to the present. They were given the veterinarian's certificate by the Governor-General of Taiwan which authorized them to practice veterinary medicine in Taiwan only. However, few of them actually became practitioners; most of them obtained positions in government institutions as personnel for animal husbandry extension work and animal diseases control. Besides these, there are at present 470 Formosans who received secondary veterinary education in Japan.

II. Higher School Veterinary Education

There are no institutions of Higher School veterinary education in the Island. But there are 55 Formosans who have been trained in Japan.

III. University Veterinary Education

It was 1931 when veterinary education of university standard was considered for the first time in the Island, though this education put a stress on animal raising rather than veterinary science and did not aim at training of veterinarians in a strict sense.

First the Chair of Animal Husbandry was set up as a chair of the Faculty of Agriculture in the Taihoku Imperial University. Veterinary hygiene lectures were given as a subject attached to the Chair of Animal Husbandry. However, I, who came to the University as the professor in charge of the Chair of Animal Husbandry, was convinced that adequate knowledge of veterinary science was not to be dispensed with in the development of animal industry, not only in Taiwan, but also in the region south to China. I suggested this to the University authorities and the Government-General on many occasions. Yet, due to a financial setback and the attitude of the University authorities which were set more earnestly on expansion of other departments than on improvement of the veterinary section, my idea was not realized. Meanwhile, in Japan proper veterinary education had been enlarging and extending. Instigated by this example and responsive to greater demand for animal production, Taiwan felt it necessary to establish veterinary education of University standard. Thus, in 1941 The Taihoku Imperial University added a new addition of the chair of Animal Hygiene to its institutions. In April, 1941, there set up was the Veterinary Section which consisted of six chairs and three laboratories as follows:

Animal Husbandry I, Animal Husbandry II, Animal Hygiene, Animal Pathology, Animal Internal Medicine, Animal Surgery, Laboratory of Veterinary Anatomy, Laboratory of Physiology, and Laboratory of Hippology.

The students who specialize in veterinary science were admitted in 1943 for the first time. Since no Formosan responded to the invitation, those who entered the section were all Japanese.

In accordance with the Wartime Student Mobilization plan, the students joined the military service as veterinary assistants, attending lectures as students at the same time. At the end of the war they continued their studies until March, 1946, when they were required to return to Japan as all the Japanese residents in Taiwan were repatriated. Six students went as the first graduates of the section.

The second year and first year students who were also all Japanese went back with the others, and they were admitted to various universities in Japan.

The lectures and facilities of the Section in the Taihoku Imperial University are given a summary explanation as follows:

a. Lecture course.

Lectures	First term (hours a week)	Second term (hours a week)
Principles of Breeding	2	2
Animal Husbandry	2	2
Veterinary Anatomy	5	3
Histology	2	0
Embryology	2	0
Veterinary Physiology	3	3
Biochemistry	2	2
Veterinary Pathology	1	3
Pathological Anatomy	3	3
Parasitology	0	2
Veterinary Hygiene	2	2
Bacteriology	2	2
Infectious Animal Diseases	1	1
Clinics	2	4
Diagnosis	0	2
Immunology	1	1
Pharmacology	3	3
Veterinary Police	1	0
Surgery	2	4
Surgical Operation	1	0
Obstetrics	3	0
Ophthalmology	1	0
Animal Nutrition	2	0
Cultivation of Forage Crops	1	0
Manufacture of Animal Products	1	1
Hippology	2	2
Government Policy of Animal Husbandry	2	0
Shoeing of Horses	2	0

Practices	First term (hours a week)	Second term (hours a week)
Animal Husbandry	1	2
Animal Anatomy	3	1
Histology	1	1
Embryology	1	0
Physiology	2	0
Biochemistry	0	1
Demonstration of Pathological Materials	0	1
Pathological Anatomy	2	1
Veterinary Hygiene	0	1
Bacteriology	1	1
Infectious Diseases	not regulated	
Clinics (Internal)	1	1
Pharmacology	0	1
Clinics (External)	1	1
Hippology	1	not regulated
Horse-shoeing	0	1
Horsemanship	not regulated	
Care and Management of Dairy Cattle	not regulated	
b. Facilities.*		

*[Ed. note] The list of buildings with their descriptions given by Professor Yamane is too long to reproduce here. They seem amply adequate for classrooms, laboratories, animal shelters hospitals, storage, etc. The same holds for laboratory equipment, library, books and scientific periodicals.

IV. Higher Schools Educated Veterinarians in the Island

According to the inquiry of April, 1944, the recipients of higher veterinary education in the Island numbered 11 university graduates, all Japanese, and 113 higher school graduates. Among the higher school graduates there were about 50 Formosans educated in Japan.

Why is the number of Formosan veterinary students so small? Why are there no Formosan university graduate veterinarians?

In Japanese days the Formosan youth had the same educational opportunities as the Japanese. Education of the Formosan children, however, who had not yet mastered Japanese was undertaken by the *Kogakko* (the public school; this was distinguished from the *Shoggakko*, the primary school for the Japanese children). From secondary education upward, both Japanese and Formosans used the same institutions. Accordingly, in part because of language difficulty there was small chance for the Formosan children to win, coping with Japanese children, in entrance examinations to both Secondary and Higher Schools, which provided intense competition for the applicants.

Those who had both the brains and the financial resources to traverse the difficult pathway to the University, usually went to the fields of technology, medicine and law; the agricultural division had few applicants. As for veterinary science, even the Taihoku Imperial University the most convenient for Formosans received no applications.

C. Conclusion

It has invoked profound gratitude and admiration in those who have lived in Taiwan, that the United Nations Relief and Rehabilitation Administration has extended a great assistance to Taiwan toward recovery from her war wounds. In the field of animal husbandry efficient scientists and technicians have been dispatched to the Island to investigate how to administer relief, to take up animal disease control, to distribute dairy cows, and to give dairy products to the infants and the sick; in short, this organization has made the utmost effort to rehabilitate the Island.

However, if I may venture to comment rather bluntly: the relief extended by UNRRA so far, is more appropriate as a post-war first-aid than as a fundamental measure with longer view of eventual development of animal husbandry in China. And the UNRRA efforts here will lose the ground gained if competent veterinarians of this country are not developed to replace the Japanese who were repatriated in bringing about a better animal industry. UNRRA would get surer and more far-reaching results by improving higher veterinary education in China so that efficient veterinary personnel might be available in a sufficient number. Men so trained would take leading parts in the realization of a high standard of Chinese animal industry, which is just as vital as providing dairy products.

In view of this, I assume it would be more fruitful for the Veterinary Science Laboratory of the National Taiwan University, which, as all the Chinese professors here invariably admit with sincerity, is incomparably better than that of any other Chinese universities in facilities for veterinary education, were reconstructed and reenforced, that the Veterinary Section, cooperating with the Tansui Serum Plant, may receive a large number of Chinese students and its graduates take an active part in improvement of animal industry and disease control all over continental China as well as in Taiwan.

Needless to say, the University authorities are well aware that veterinary education is indispensable. But due to financial difficulties, immediate renovation cannot be accomplished from its own resources. If the UNRRA office would render assistance in re-establishing the Veterinary Section of our University with full understanding of the matter mentioned above, the University authorities, I presume, would acknowledge it warmly. My gratification as the one who laid the corner stone of university grade veterinary education on this Island needs no substantiation.

Veterinary Problems of the Fur Ranch

By T. T. CHADDOCK, M.S., D.V.M., Grafton, Wisconsin

Mistakes in Mink Breeding

I have noticed during this era of mutation breeding that many of these mutation mink are protected with great care, due to their scarcity and high value. I am convinced that many of them could not survive in the wild due to weaknesses from inbreeding.

I have observed many hereditary defects that were rarely seen heretofore, such as diaphragmatic hernias in which the mesentery, stomach or even a loop of intestine was present in the chest cavity. Entire deafness has been observed and if one was careful the animal could be handled easily while asleep. An increasing prevalence of hermaphrodites is noted on necropsies. A peculiar twisting of the head and neck in these inbred animals has been dubbed "screwneck." Recently in some pastel mink it was observed that they could not stand moderately strong light without discomfort. In the relatively new Aleutian mink, undigested food has been observed in the droppings. Many of these animals must be fed small quantities of feed four or five times daily, in order to facilitate digestion.

This is an instance where the fur rancher has been breeding for a fur without thought for the physical wellbeing of the animal.

Filth Borne Infections of Mink

Fur ranching, particularly mink ranching, faced practical obliteration recently near some Central Canadian cities according to a news item. In what is reputed to be one of the finest mink raising sections in the world, the industry suffered extensive losses from a condition common in many districts. All officials agreed the losses were due to filthy conditions existing at the city dumps of two adjacent cities.

The disease appears to have broken out in August (1947), on scattered farms. The feed supply was investigated and found to come from two main sources. Farms using feed from each source were involved and others using the same feeds were not involved. Deaths were confined almost entirely to this year's kits. Diarrhea and vomiting, refusal to eat and death within a few days were the principal symptom. Injections of botulinus antitoxin proved to be valueless.

Post-mortem lesions of disease were few. On culturing, a small gram-negative bacillus, much resembling the Haemophilus group, was isolated from the blood, while in other instances *Eschrichia coli* was readily isolated. Approximately 5000 animals succumbed before the disease had run its course. Another interesting incident is the fact that a colony of Guinea pigs in a laboratory was entirely wiped out shortly after material from the mink farms was submitted for laboratory investigation. The same organism was isolated from these experimental animals. Only one farm at present is involved, but ranchers are apprehensive of the coming of warm weather.

The vectors in this case could be one or more of several birds and animals, as there were great numbers of crows, ravens, seagulls, starlings and sparrows as well as foxes and stray dogs feeding on refuse at the city dumps and wandering from farm to farm.

I have seen outbreaks of Coli infections before but never with a rate of pathogenicity so high.

Fur Industry in the Doldrums

The present outlook for the fox farmer is gloomy. There are so many things to worry him that many have tossed in the towel and sought other means of livelihood. A few of the things that have brought these conditions to pass are:

1. The dumping on the United States market of tremendous quantities of furs from foreign countries.

2. Increased cost of feed, labor, and overhead.

3. Deterioration of pens and farm equipment and unavailability of materials with which to make the necessary repairs.

4. Lack of demand for fox furs. Some ranchers have their furs from three years past.

5. Many fur farmers were caught with inferior animals and as a result can place only inferior furs on the market.

6. The cost of a fox today is $25 to $27 to produce a fox today. At the last sale light platinum foxes brought $64.00, light white faces $34.00 and full silver foxes brought $15.00 to $18.00. This certainly does not add up to a money making proposition.

Some ranchers are quite optimistic, however, believing that when the inferior material is off the market, there will always be room for good quality furs.

Veterinary Problems in Poultry Production

By W. R. HINSHAW, D.V.M., Ph.D., Davis, California

High priced feeds have stimulated research work on the availability of by-products as substitutes for standard poultry feeds. Cannery and dried vegetable waste are among the by-products which seem to have merit. Lillie and Briggs *(Poultry Sci.,* 27:7-11, 1948) report that semi-solid vegetable wastes are an excellent source of carotene for poultry. Chicks appeared to relish such vegetable wastes, when added to rations that were low in vitamin A, and they grew at a slightly faster rate than chicks fed a similar ration containing alfalfa leaf meal as the source of vitamin A.

Van Roekel *(Feathered Fax),* in reporting the results of the 1946-47 pullorum testing program in Massachusetts, stated that pullorum infection was found in 17 flocks which had been non-reacting the previous season. The source of the "breaks" in the majority of the flocks appeared to be due to the purchase of, or association with, questionable pullorum-free stock. This is the season when veterinarians should warn their poultrymen clients against the purchase of replacements from hatcheries with a questionable pullorum history. The only safe chicks or poults are those that come from pullorum-free sources (U. S. Pullorum-Clean or U. S. Pullorum-Passed).

Kitchell, Cass and Sauter, *(J.A.V.M.A.,* 11:379, 1947) reported an outbreak of intestinal fluke *(Echinostomum revolutum)* infestation in five-month-old turkeys. The symptoms observed by them were marked depression and a light brownish diarrhea. The important post-mortem lesions were dehydration, enlargement and congestion of the lower intestine and ceca, with thickening of the mucous membranes. There was a thick granular slimy gray exudate adhering to the intestinal walls, and this exudate contained many flukes. The snail *Helisoma trivolvis* was found to be the intermediate host for the fluke. Treatment of sick birds with carbon tetrachloride given per rectum proved successful in removing the flukes. The drug was mixed in liquid paraffin (2cc of carbon tetrachloride to 3cc of paraffin) and each bird was given 7cc *via* a rubber hose attached to a glass syringe. To prevent further contact with infested flukes, the flock was moved to higher ground.

At the July 1947 conference of Official Delegates of the National Poultry Improvement Plan, it was recommended and later approved by the Bureau of Animal Industry, that at the end of the 1948-49 hatching season the U. S. Pullorum-Tested class shall be deleted from the plan. This is a most important change which should do much to encourage eradication of the disease. At the same conference, ducks were added to the list of birds which may now be given official recognition if they meet the requirements of the National Poultry Improvement Plan.

During the spring months veterinarians will have many opportunities to dispense sulfonamides for the control of outbreaks of pullorum disease and other Salmonella infections in chicks and poults. If these drugs are prescribed early in an outbreak in the doses recommended by the manufacturers, mortality can be reduced. The client should be warned, however, that many of the survivors will be carriers, and that treated flocks should *not* be saved for breeding purposes. Owners of such flocks should be advised to buy replacement stock from known pullorum disease free sources (U. S. Pullorum-Clean or U. S. Pullorum-Passed). *Sulfa drugs may aid in the control of these diseases but they are not substitutes for a preventive program.*

Laboratory Diagnostic Service

Most of the states now have well-equipped laboratories where veterinarians may send or take chickens, turkeys, or other birds for laboratory examination. Unfortunately, the majority of the specimens which are sent to these laboratories come from the flock owners, or from farm advisors, feed service agencies, hatchery servicemen or similar agencies, which sell products to the poultryman, rather than from veterinarians. Veterinarians often make the mistake of requesting a poultryman client to forward sick birds to such laboratories, rather than sending or taking them himself. When such a mistake is made it is natural for the client to wonder why it is necessary to call a veterinarian. Usually he does not do so thereafter. The poultry industry as well as the veterinary profession will profit if more veterinarians interested in poultry will make greater use of the excellent laboratory facilities which are available to them.

Clinical Trial of a New Skin Antiseptic Zyclophen Veterinary

By R. T. DICKINSON, D.V.M.
Dallas, Texas

THE treatment of various skin conditions in small animals is a common and frequently difficult task in veterinary practice. During the last few months the writer has had occasion to try a new acaricide and skin antiseptic developed by Dr. Max N. Huffman of the Southwestern Medical Foundation, available under the trade-name of zyclophen veterinary.* The results obtained were so striking, especially in eczematous skin conditions, that it seems desirable to bring this new treatment to the attention of the practicing veterinarians. Reports on the use of zyclophen have appeared in the pediatric literature[1] but, so far as the writer knows, this is the first report on the use of this ointment in veterinary medicine.

Zyclophen veterinary is composed of the following ingredients:

4-Chloro-3, 5-dimethylphenyl hydrogen *d1*—camphorate	2.0gm
Ortho-phenylphenol	2.0gm
Anhydrous lanolin	4.0gm
White petrolatum	92.0gm

It appears from the composition of this ointment that it should be well suited for a variety of skin ailments. The active ingredients are potent bactericidal and fungicidal agents and they have acaricidal properties also. In addition the ointment is a skin anesthetic and tends to prevent itching.

It should be noted that the active ingredients are present in a relatively low concentration, when compared with sulfur or coal-tar containing preparations. This low concentration of active ingredients is important in an ointment which is non-irritating to sensitive structures, such as the eye.

In all cases reported below the ointment was applied twice daily.

Case 1.—Eczema of the ear in a six-year-old dog with secondary infection, pus and considerable itching. Complete recovery took place in 10 days.

Case 2.—Eczematous skin condition in a twelve-year-old dog, characterized by thick skin on the back which exuded pus. There was marked pruritus with itching. Recovery was complete in three weeks.

Case 3.—Ringworm in a dog. Cured in one week. This animal had been treated previously with intravenous sodium iodide without satisfactory results.

Case 4.—Dry eczema, in a seven-year-old dog. Very good results following a three-week treatment.

Case 5.—Eczema with secondary infection in a dog. Improvement was slower than in the previous cases, but the pus disappeared in six weeks.

Case 6.—Dry, non-purulent eczema in a dog, less than one year of age. Excellent results were obtained in one week.

Case 7.—Deep seated probable fungus infection of the skin, in a puppy four months of age. Improved greatly in one month.

Case 8.—Chronic skin infection of the tail, in a two-year-old dog. Complete recovery in five weeks.

Case 9.—Eczematous skin condition with pus, in an eight-year-old dog. Complete recovery in one week.

Case 10.—Non-parasitic dermatitis, in a five-year-old dog. There was decided improvement in nine days.

Case 11.—Dry eczema with no pus, in a six-year-old dog. Itching was relieved in one week. Relapse occurred, which is being treated at the present time.

Case 12.—Sarcoptic mange in a young cat. Skin lesions healed in 10 days.

Case 13.—Ringworm in a young cat. Sodium iodide was given intravenously followed by the standard zyclophen treatment. Recovery took place in less than three weeks.

Comments

As indicated in our case reports, most of our experience with zyclophen veterinary was obtained in treating small animals, which had an eczematous condition of the skin, characterized by thickened, itching skin which contained pus. It is the writer's opinion, that

*Zyclophen veterinary was supplied through the courtesy of the U. S. Standard Products Company, Woodworth, Wis.

the results obtained in this type of skin ailment were far superior to results he has attained in the past by using various other antiseptic ointments. Zyclophen veterinary relieved the itching quite rapidly and it seemed to have eliminated the infection as evidenced by the disappearance of the pus. It was particularly gratifying to find that the ointment could be applied around the eye without any evidence of irritation of the conjunctiva. The owners found it easy to continue treatment at home because the ointment is colorless, non-staining and has no objectionable odor. McElhenney[1] used zyclophen in children and reports it to be an effective acaracide. The writer's experience in the treatment of sarcoptic and demodectic mange, with zyclophen veterinary, is not sufficiently extensive to make a similar claim as to its efficacy in mange of animals. It is certain, however, that the ointment has properties which would tend to make it well suited for the treatment of any skin condition which is accompanied by itching and secondary infection.

Summary

Zyclophen veterinary, a new sarcopticide and skin antiseptic ointment, gave excellent results in the treatment of a variety of pathological skin conditions. Results were especially gratifying in eczematous skin lesions with secondary infection in dogs and cats.

References

1. McElhenney, T. J. The treatment of scabies in children with a new sarcopticide. J. Pediatrics, 29, pp. 189-191 (August). 1946.

What Animals Owe to Experimental Research

Rabies occurring in dogs and other animals and man is certainly one of the most terrible of all diseases. In many countries it is a constant menace. Affected dogs are uncontrollable. They run from home and are disposed to attack and infect any animals and human beings in their way. As the result of experimental research we know the cause and methods of transmission of this awful disease and we have been able to exterminate it from this country and prevent its re-introduction by means of rigid quarantine of all imported dogs. As dogs are the main source of infection, an incalculable benefit to animals and man has resulted from a systematic immunization of dogs in countries where rabies is rife. The effect is most successful and I would quote an extract from a personal communication received just before the war from the Commissioner of Inspection and Sanitation for Kansas City. He says: "For a number of years prior to 1927 this city was visited regularly with an epidemic of rabies in which a large number of animals died of the disease. Many persons were bitten and were compelled to take Pasteur treatment. The prevalence of rabies in this city in 1927 was high. Action was taken by the City Council and the compulsory law (vaccination of dogs) was enacted. As a result there has been a steady decline of rabies in so far that today we have scarcely any at all, and such cases as do occur are in outlying districts where the enforcement law has failed. We have vaccinated some 150,000 animals and find that less than five breaks have occurred in the vaccinated group. To any city desiring to control rabies and do an act of kindness to dumb animals the vaccination of all dogs is recommended. The experience of this city disproves any claim of anyone that vaccination is harmful to the animal."

I fear I may have gone on far too long and quite exhausted the patience of my listeners. There is so much more that could be said, but I trust I have amply shown that practically all species, of domesticated animals at any rate, do reap and enjoy most remarkable benefits as the result of experimental research, and no veterinary surgeon could possibly do his duty to the animal world unless he took full advantage of the remarkable discoveries by various research workers, and particularly those of his colleagues in the veterinary research institutes. —From an address by Prof. Geo. H. Wooldridge, F.R.C.V.S., Vet. Rec., 59:33 (August 30). 1947.

To Keep Brick, Stone and Masonry Clean

Brick, stone or masonry have long been favored as building materials on account of their good appearance and low up-keep costs. There is, as a rule, no regular paint bill to be paid or rotted timbers to be replaced and this is a comfort to anyone busy with other thoughts. However, the long period of use allows lichens and moss a chance to start and form growths which if not exactly destructive to the stone, masonry or brick, displeasing in appearance, and they hold a certain amount of moisture against the walls which is destructive.

The removal of lichens and moss from masonry is simple. Make a 1% solution of carbolic acid and apply to the growth. A few hours or days later the plants can then be washed off with water.

There are many places where ivy adds to the attractiveness of walls, but it to is destructive to stucco and masonry, principally by delaying drying.

—L. R. Palmer.

Clinical Reports

Ear Cropping of Dogs

The messy, and sometimes tiresome task of trimming ears is often a headache for the veterinarian. Some prefer not to do the job at all and the client is forced to turn to another veterinarian or to a layman. This usually means a client lost. Some of the most popular breeds have their ears cropped and how to crop them is something every veterinarian is expected to know.

With a little practice good results can be attained with a minimum effort. I'll present our method in the hope that others may find in it a few helpful hints.

Ears may be trimmed at any age, but we prefer to let the size of the pup be the indication. A normal, healthy Boxer, Dane, or Doberman of 10 weeks is not too young. In fact we find the ideal age for these breeds is from 10 to 12 weeks and 15 weeks the desirable limit. A Schnauzer (any type) or Boston can be cropped at any age though we prefer to do the job at from 3½ to 4½ months of

Ears were cropped at 11 weeks

age. If the trimming is at this age, there is a minimum amount of discomfort and the pup is seldom head-shy for any considerable period.

We use nembutal intravenously and strive to obtain good surgical anesthesia. One does not care to suture the ears of an animal that shakes its head at every suture. Then too, many times a client will want to watch, and the pup must not evidence pain of any sort.

The anesthetized pup is placed on his sternum, head between paws and the ear canal is plugged with cotton. The height of the ears is important. Usually the longer the ears the better—within reason. However, the final product must stand. A fair scale to use is to bend the ear in half from tip to base. The midway point of the top half is the guide for the top point for the trimmed ear. However, we prefer

Twenty-four hours after being cropped

to size up the ear according to the shape and size of the head. Once the top point is determined, center both ears over the head, tip to tip. Place tension upwards, keeping the ears even and together and nick both ears at the predetermined top point. Then mark out both ears with indelible pencil. This is a sort of freehand method, but if one uses care, good results can be obtained.

The shape of the ear is determined to some extent by the client's desires. We prefer one with a slight curve. However, some clients want a straight trim; others want a curved tip to the ear.

We use a heavy type scissors to cut along the marked areas. Hemorrhage can be controlled by pressure or preferably mosquito forceps—rarely is ligation necessary.

Before suturing, I strongly advise removing a piece of skin on the lateral side of the ear to insure firmer tension. Begin at the base of the ear and remove skin almost to the tip of the new ear, keeping in mind to leave sufficient skin to flap over the raw edges and insure first intention healing. We use continuous sutures of twisted silk or horsehair, bringing the edges closely together but not tight enough to cut through, *i.e.*, allow for some swelling. A thin sharp straight needle is excellent for placing the sutures.

Aftercare is easily 50% of the job. The head is washed, rubbed dry and the ears flapped back over the head, bandaged and taped. We

remove the head bandage in 1 to 2 days.

A well cut ear need not be splinted at all, but we make it a practice to splint the ears immediately after removal of the head bandage. We use X-ray film rolled into a cone the

Appearance of ears on 5th day

shape of the ear. The edges are taped, and 2 or 3 pieces of adhesive used to hold it to the ear. This type splint is preferred as the ear is maintained in an erect position and yet it allows the animal to move it readily. We remove the stitches on the 5th or 6th day and rarely leave the splints on. Older dogs or dogs with ears too long occasionally are splinted for several days to several weeks if necessary, but the animal tolerates this device well. After using all types of splints we are firm in the belief that X-ray film so used insures the best result.

Summary

Good results with minimum effort can be expected by following the main points:

1. Adequate anesthesia.

All healed and going home

2. Even marking of ears with indelible pencil.
3. Removal of excess skin before suturing.
4. Continuous sutures to bring free edges in apposition, but not tight enough to cut through.
5. Bandaging of head following surgery to prevent damage while animal is recovering from anesthesia.
6. Splinting with a light weight device, such as X-ray film to maintain erectness and yet allow mobility of the ears.

In case of older dogs (6 months to one year of age and older) the ears should be cropped shorter. Less trouble will be encountered by so doing. We never advise late cropping as the animal is usually head-shy for some time after the operation and this does not speak well for dogs in the show ring.

All in all, excellent results can be obtained in ear cropping with the exercise of a little care.

NORMAN HERBERT, D.V.M.
Baltimore, Maryland

Intocostrin Dosage for Dogs

Intocostrin* has been given in 20 cases following light anesthesia with nembutal and pentothal sodium. The average dose in the 20 cases was 0.67 units of intocostrin per pound of body weight. The lowest dosage was 0.4 units per pound of body weight and the highest 0.8 units. It is always wise to have a little extra intocostrin in the syringe and inject it very slowly until a stage of complete relaxation is reached. In case of respiratory depression give oxygen and give prostigmine.

Intocostrin is excellent for relaxing an animal for X-ray and fluoroscopic work, in setting fractures and reducing luxations. We have found it especially good for the "squealer" when doing abdominal surgery.

H. J. APPLE, D.V.M.
E. L. ACKERMAN, Ph.D.
Columbus, Ohio.

New Use for Car Jack

On a cold night I was called some 40 miles to effect a delivery of a three-year-old Hereford. On arrival I learned four big fellows had been pulling on the calf for about two hours with a double block. The ropes were tied to the front legs which were presented and the head was turned back.

I tried to push the shoulders back out of the pelvis, but strain as I would I couldn't move them. The situation was one that might be described as an impacted impasse. Orthodox methods being out and nothing at stake, I used my car jack to force the fetus back into the uterus. The first movement loosened it and I easily pushed the remainder of the way

*Intocostrin, a Squibb & Sons product.

into the uterus with my hand and brought the head forward without difficulty. Moderate traction with an obstetrical chain fastened on the calf's jaw finished the delivery, with the heifer apparently none the worse for rough handling. With my fee collected I headed for the next job.

I've seen many an obstetrical case in almost 40 years' practice, but nothing like this before.

E. A. Hall, M.D.V.

Little Falls, Minn.

★ ★ ★ ★

Bovine Laminitis

Tuesday, September 30, 1947, we received a call reporting that a 900-pound, four-year-old, Jersey milk cow had eaten about 85 pounds of chicken feed during the night. The door of the granery had been left open and the animal gained access to the feed which consisted of cracked corn and wheat.

Upon our arrival the cow was standing with a distended rumen, loose moving bowels and was showing signs of an acute indigestion. The rumen was so distended that the feed was being regurgitated and coughed out upon the ground.

A diagnosis of acute indigestion was made and the treatment consisted of: magnesium sulfate 1 pound, spirits of ammonia 1 ounce, formalin 1 ounce, pine oil 1 ounce, tartar emetic 120 grains dissolved in six quarts of water and given *via* a stomach tube. The owner was advised to knead the rumen and to exercise the animal several times during the day. If symptoms of founder appeared he was to notify us immediately.

Wednesday night, October 1st, the owner called to report that the patient was showing evidence of founder. On arrival the following symptoms were observed: (1) Soreness of the feet as was manifested by reluctance to move and by pain evinced when pressure was applied to the hoof. (2) When forced to move the steps were short, choppy and very painful. (3) the patient stood with arched back and feet placed well under the body.

On the basis of the report by Jean Chavance[1] the following treatment was administered: One gram of powdered benadryl[2] dissolved in 100cc distilled water was given intravenously. This administration produced side reactions of irritability, hyperesthesia and grinding of the teeth. Three capsules containing one gram benadryl each were dispensed to the owner with instructions to give one capsule *per os* at 12-hour intervals.

On October 3rd, 36 hours later, the owner reported that all symptoms of laminitis had disappeared and the animal had completely recovered.

Conclusions.—The results obtained in this case tend to indicate that benadryl is an effective agent in the treatment of acute laminitis in cattle. Possibly the reduction of the dosage would eliminate or alleviate the intensity of the side reactions.

J. E. Mosier, D.V.M.
E. L. Church

Manhattan, Kans.

★ ★ ★ ★

Udder Injection Without a Tube

As it is becoming general practice to treat mastitis by intramammary injections, it is high time the use of the milk tube be discontinued as unnecessary and undesirable. It is quite simple to force even sulfanilamide in oil of heavy consistency through the teat sphincter, by using a nozzle with an opening 5mm in diameter and holding the end firmly against the nozzle with the meatus matching the opening in the nozzle. If the nozzle is too large the liquid tends to force the teat away from the nozzle. Openings in the nozzle from 2mm to 5mm in diameter are satisfactory depending upon the rigidity of the shuecter and the consistency of the fluid to be injected.—From T. J. Coyle, M.R.C.V.S., Pukekohe, New Zealand, in *Vet. Rec.*

21-YEAR-OLD COW AND HER 24TH CALF

This prolific cow has delivered four sets of twins and 16 single births. She belongs to William Hilke, Pickett, Wisconsin. At present she is producing 60 pounds of milk daily but her total production is unknown since no record of milk production has been kept. She had an attack of milk fever last year (23rd calf), but has not suffered from mastitis during her long career in milk production.—E. E. Anderson, D.V.M., Ripon, Wis.

[1] Chavance, Jean. Histamine theory and treatment of laminitis. *Vet. Med.*, 41:6, p. 199 (June), 1946.

[2] Benadryl (beta-dimethylaminoethyl benzhydrl ether hydrochloride) a Parke Davis & Co. product.

Abstracts

Antihistamine Treatment of DDT in the Milk of Cows Following Spraying

Research workers[7] at the Oklahoma experiment station conducted a study to determine if milk cows sprayed with DDT eliminated the insecticide in the milk. Sixteen cows were divided into four lots. Lot I was sprayed daily with a 5% suspension of DDT; Lot II was sprayed daily with a 1% emulsion; Lot III was sprayed with 0.25% suspension and Lot IV with 0.25% emulsion at two-week intervals. The experiment was continued from July 15 to August 30.

All animals excreted DDT in the milk.

Lots I and II eliminated the insecticide till the end of the lactation, 119 and 126 days after the final spraying, but did not eliminate DDt after freshening.

Periodical Variation in the Fertility of a Bull

Bondonna and Franecshi[11] made an analytical examination of the record of a bull used for artificial insemination over a period of three years. The data concerned the sexual activity, behavior at mating, sex drive, quantity, quality and characteristics of semen and the average number of inseminations required for successful impregnation.

The study revealed a periodicity in the occurrence of decreased libido; impoverished semen in the number, activity and normal morphology of spermatazoa, and low fertility. These periods were synchronized with normal seasonal changes in the quantity and quality of feed, *i.e.*, with variations in the plane of nutrition of the animal.

By maintaining the bull on a uniformly well-balanced, nutritious diet, adequate in amount and of inviting palatability the authors were able to stabilize this bull at a satisfactory level of fertility. At certain seasons natural feeds were supplemented with ascorbic acid, vitamin A, and male hormone.

The authors emphasize the importance of palatability as being likely to be overlooked. For example, late cut hay may be of good appearance but a bull may eat much less of it than he will of early cut hay. At seasons of the year when green feed is not available, tubers (sliced beets, beet pulp) or germinated oats, should be fed not only for nutritive qualities but for appetizing effect also.

The influence of nutrition on the bull's sex drive and fertility has been established.

The authors offer the following suggestions for year round stabilizing bulls on a high level of fertility.

1. For energetic sexual desire, quantity and quality of semen, and fertility, the best roughage is one with low moisture content, *i.e.*, good quality, second cutting hay from well drained meadows.

2. Bulls should be allowed at pasture in the spring when the grass is young and rich in stimulating substances. Grass alone should not be depended upon in the summer and autumn when its nourishing value is decreasing. Late pasture may be used if supplemented with grain or tubers.

3. It is good practice to add some concentrates to the forage. Within market availability the concentrates should be those that are less fattening—soybean oilmeal, peanut oilmeal, germinated oats, germinated barley.

4. When the forage is from irrigated fields or meadows it must be supplemented with minerals. Calcium phosphate and degelatinized bone are recommended.

5. Vitamins (A, C, and D) parenterally, are recommended when the bull is kept indoors on dry feed.

6. Bulls should live as much as possible in the open and have plenty of exercise. It is a good practice to use them moderately for field work.

Rabies in South America

A type of rabies of which the vampire bat, *Desmodus rufus*, is the principal, if not the sole, vector is extremely prevalent in the cattle and horses of certain areas in South America. Man, particularly in Trinidad, is sometimes inoculated (while sleeping) with this type of rabies, but it is rare in dogs, according to brief accounts that have appeared in our literature. This type of rabies is so prevalent in some sections of Colombia, Venezuela, Brazil, and possibly some other countries that cattle turned on pasture without vaccination against rabies mostly die of the disease. The vaccine, however, is successful in protecting them from inoculation by the blood drinking bats.

[7] Howell, D. E., Cave, H. W., Heller, V. G., and Gross, W. G. The amount of DDT found in the milk of cows following spraying, *J. Dairy Sci.*, 30:9, pp. 717-721 (September), 1947.

[9] A new reason for eradicating rabies. *Vet. Med.*, 42:8, p. 279 (August), 1947.

[10] Novicky, Richard. Prispevek k studiu paralyticke formy vztekling u skotu v Jizni Americe (with summary in English, Russian and Spanish. *Casopis Ceskoslovenskych Veterinaru*, 2:13, pp. 301-327. 1947.

[11] Bondonna, T., and Franecshi, L. D. Observations on periodicity of the fertilizing power of a bull which had shown periods of depletion of the semen, *Zootecnica Veterinaria—La Fecondazione Artificiale*, Vol. 1, No. 1 (Jan.-Feb.), 1946.

Last summer vampire bats were discovered[9] in caves in Mexico, only 300 miles south of the Rio Grande, by an American speleologist. The ease with which they can migrate across the border into the southwestern states lends im-

portance to a recent exhaustive article[10] on this type of rabies.

According to Novicky paralytic rabies of cattle has been known in Brazil since 1911 when it was first described by Carini. Since that date it has spread over almost the whole of the South American continent. This is an indication of how rapidly it may be expected to spread in the United States if both the bats and the virus take up residence here.

The virus of paralytic rabies of cattle is in many respects identical to the virus of canine rabies, but possesses some biological and immunological characteristics which the latter lacks. This is regarded as being a result of long passage through bats. These little mammals do not die of the disease or indeed show any symptoms of the infection and hence are true carriers.

Cattle and goats are extremely susceptible to the virus *via* the intracerebral route, 70% are susceptible by injection into peripheral nerves and to virus rubbed into scarified skin or nasal mucosa.

Dogs and swine are susceptible only to intracerebral inoculation.

The virus was present in the saliva of affected calves but could not be demonstrated in the salivary glands, spleen, liver nor pancreas. Nor could it be found in the brain of fetuses taken from cows dying of rabies. Ticks collected from sick animals contained no virus.

In all the author's experience with a large number of inoculated cases and many spontaneous cases he never saw a case of furious rabies due to this type of virus. At first great pruritus and later a painful sensitiveness, was manifest at the site of inoculation. The post-mortem lesions were the same as in canine rabies except there were no foreign bodies in the stomach—not even in artificially infected dogs.

Strains of virus were prepared for the manufacture of vaccine by passing them serially through calves until they became fixed. This required 52 passages in the case of one virus and 14 passages in another. The incubation period in the case of the first virus was reduced from 18 days to six, and the course of the disease from five days to one day. The incubation period of the second virus was reduced from 11 to six days and the course to one or two days. Negri bodies could not be found after the seventh serial passage. There was no further change in the incubation period or course after the virus became fixed up to the 275th serial passage.

Vaccine was made from the brain and spinal cord of calves (eight or nine months of age) and inactivated with phenol. When all cattle at pasture were vaccinated, paralytic rabies ceased to be a problem.

The antigenic properties of the vaccine were examined according to the Habel mouse test. The protection conferred by the different lots was always higher than that required for a standard vaccine in the United States.

* * * *

The Contagious Nature of a Lymphoid Tumor in Chickens

In this article the author[8] who is connected with the U. S. Regional Research Laboratory at East Lansing, Mich., presents many observations supporting the theory that the genesis of certain tumors is a virus. Entirely aside from the main point at issue, observations cited are of great interest because of their bearing on disease control.

When the laboratory was established (1939) only hatching eggs were brought onto the premises, nor have any live chickens been introduced since. As a result there has been no infectious disease among birds but lymphomatosis and no parasitism but coccidiosis. The author regards this as very strong evidence that lymphomatosis was brought onto the premises in the hatching eggs. By keeping families in isolation they have been able to raise chickens relatively or entirely free from lymphoid tumors and all other recognized diseases and parasitisms. This result was attained notwithstanding the family was highly susceptible to lymphomatosis and up to 44% of sib controls, which were exposed to the disease, contracted it.

[8] Waters, N. F. The contagious nature of a lymphoid tumor in chickens. *Sci.*, Sept. 12, 1947.

Book Reviews

Private Enterprise or Government in Medicine, by *Louis Hopewell Bauer,* A.B., M.D., F.A.C.P. Member, Board of Trustees, American Medical Association, etc. 201 pages. Published by Charles C. Thomas, Springfield, Illinois; 1948. Price $5.00.

This is a useful work. It contains a wealth of information on the most controversial subject—if not the most contentious question in medicine at the present time. It requires only zero in powers of deduction to reach a conclusion that the objective of the writer, a trustee of the American Medical Association, is to prevent American medicine from being "socialized" and becoming a "political football" dominated by "bureaucrats."

It will not make any converts for the cause that lies near to the author's heart. It is pure propaganda. However, the information it contains will enable better dialecticians to go far in crystallizing public sentiment for or against the various bills, for improving the medical service of the nation, which are pending in the Congress.

One of many valuable features of the work is a listing of the very large amount of state (the author would call it socialized) medicine we already have and some account of its development. It includes, the medical services of the Army and Navy and Air Force; of the Veterans Administration, the Interior Department, the Public Health Service, the Venereal Clinics and of the Tuberculosis Hospitals in the federal service. Listed among state and local health services are state, municipal and county health commissions, the school health services, city, county and community hospitals, etc. To the author all these are splendid outgrowths of private enterprise, but any further extension will put doctors under the thumb of bureaucrats and destroy the age-old relationship between patient and physician. He is obsessed by neophobia. He cites the deterioration of medical service in Germany under Hitler as an argument against state medicine and its low-estate in the Soviet Republics as the clincher. The poor medical service in the United States for some of the "ill-fed, ill-clad and ill-housed" is the fault, not of medicine, but of economic and social forces. In England the panel system, largely for the same group, shows a weakness of state medicine.

The author gravely states that the American Medical Association favors voluntary health insurance and prepaid medical care. But he doesn't mention that the probability of a second conviction carrying jail sentences had anything to do with its change of heart.

From this book we learn that the blue cross hospital association has 25 million subscribers and there are 200 other hospital insurance organizations operating in the country. In addition other millions are included in industry's health plans and still others are soon to have hospital service and medical care provided by the vast health and welfare funds of labor unions. It makes one wonder what the fighting is all about.

* * * *

Atlas de Anatomia Microscopica do Rato, by *Luiz Carlos Junqueira,* Assistant in the Department of Histology and Embryology, School of Veterinary Medicine, University of Sao Paulo and *Euclydes Onofre Martins,* Assistant in the Department of Pathological Anatomy, School of Veterinary Medicine, University of Sao Paulo. Paper bound; 142 pages 9 x 12, 137 illustrations. Published by Universi de Sao Paulo, Sao Paulo, Brazil. 1947.

The usefulness of this work, in this country, is limited by the text being in Portuguese. However, the excellent illustrations speak a universal language, and the scientific nomenclature being very similar to that in English in a measure overcomes the handicap of an unfamiliar language. Laboratories using the rat in research and for testing biological and pharmaceutical products, and foods, will find it useful.

* * * *

Poultry Handbook, by *Rudolph Seiden;* 426 pages; 270 illustrations. Published by D. Van Nostrand Co., Inc., New York. 1947. Price $6.00.

Quoting from the preface, "The main purpose of this book is to help the poultry raiser improve the health of his flocks and thereby increase his income." It is encyclopedic in character and consists of a wide variety of definitions of poultry terms as well as brief descriptions of diseases arranged in alphabetic order. The author, a consultant on veterinary pharmaceuticals, disinfectants and insecticides, and chief chemist for Haver-Glover Laboratories, obtained most of his information from federal and state experiment station bulletins. He has utilized a code system for literature and author citations which are listed in the front of the book.

In the definitions and descriptions, an attempt has been made to quote the original authors' own words, though often abridged. An examination of sections familiar to the reviewer indicates an accurate interpretation of the literature cited. The wide range of definitions is indicated by the following examples: Abnormal eggs, absorbent, acetic acid, Achilles tendon, aerobe, African goose, agglutination test, Agricultural Extension Service, alfalfa,

artificial insemination, blackhead, Bourbon Red turkey, breeding house, cecal coccidiosis, fowl pox, milk, molting, pullorum disease, tattooing and zingiber. To the veterinarian the book will be of use chiefly as a dictionary; not a reference on diseases. It furnishes a convenient source of quick information on a large number of subjects pertaining to the fields of poultry husbandry and disease.—*W. R. H.*

* * * *

The Dispensatory of the United States of America, by *Arthur Osol,* Ph.G., M.S., Ph.D., Professor of Chemistry and Director, Department of Chemistry, Philadelphia College of Pharmacy and Science; and *George E. Farrar, Jr.,* M.D., F.A.C.P., Associate Professor of Medicine, School of Medicine, Temple University, with *E. Emerson Leuallen,* M.S.C., D.Sc., Assistant Professor of Pharmaceutical Chemistry, Philadelphia College of Pharmacy and Science, *Willard F. Verwey,* Sc.D., Director of Bacteriological Research, Sharp and Dohme, Inc., *H. W. Youngken,* Ph.M., Ph.D., Sc.D., Professor of Pharmacognosy and Biology, Massachusetts College of Pharmacy and *David K. Detweiler,* V.M.D., Assistant Professor of Pharmacology, School of Veterinary Medicine, University of Pennsylvania. 24th edition; 1928 pages. Published by J. B. Lippincott Company, Philadelphia. 1947. Price $16.50.

The purpose of a book review is conceived to be to convey information that will enable the reader to purchase the book without dis-

Any book reviewed in these pages, or any other book if available, may be obtained by remitting the published price to VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago 49. Bulletins and Circulars should be requested direct from the address given in the notice. Generally they are supplied free unless a price is stated.

appointment or to omit it from his library without regret. On this basis, this ponderous tome of nearly 2000 large pages, the equivalent of a score or more of average veterinary text books would require only mention of the availability of a new edition. For 115 years it has been the standard and the arbiter for all who manufacture, use, dispense and distribute drugs.

But each revision of the U. S. Dispensatory contains much that is new. This must be so, since one of its important functions is to provide original information about new drugs and supply current data about older ones. The striking developments in recent years in antibiotic agents, chemotherapy and synthetic agents in the field of hormones, antimalarial compounds, insecticides, etc., have necessitated more new material in this than in any previous revision. In the 23rd edition, for example, the discussion of penicillin occupied 22 lines; in this edition more than 2300 lines are required to summarize the essential information. Streptomycin, bacitracin and gramicidin and 50 other antibiotic substances make their initial appearance in this edition as do antihistaminic drugs, paludrine, chloroquine, DDT, antu, bal, gammexane, thiouracil and more than 200 others. The 95 articles admitted to the U.S.P. XIII for the first time have each been discussed in a new monograph. Another new feature, in the case of drugs marketed under trade names, is inclusion of the name of the manufacturer or distributor.

A final innovation is an entirely new section, Part IV dealing with the uses and doses of drugs used in veterinary medicine. Not all such drugs and biological products, but the important ones. Further in other sections of the work drugs used in veterinary medicine are indicated by a "V."

Part I deals with official (U.S.P., British Pharmacopeia and National Formulary) remedies.

Part II deals with nonofficial remedies, which include all the antibiotic substances, except penicillin, the antihistaminic drugs, most of the hormones and hormone-like agents, antimalarial compounds, DDT and other new insecticides, many of the biological products and the newer sulfonamides and, in general, new remedies not yet sufficiently established to be included in the pharmacopeia.

Part III deals with tests, processes and apparatus.

Part IV deals with veterinary remedies as already stated.

Part V includes tables of atomic weights, atomic and molecular weights, alcoholometric percentages, equivalent weights and measures, and colors.

* * * *

Bulletins

Artificial Insemination of Dairy Cattle.—Bul. 533, University of Vermont Agr. Exp. Sta., Burlington.

Ketosis in Domestic Animals.—Clinical and experimental observations by Jesse Sampson, D.V.M., University of Illinois Agr. Exp. Sta., Urbana.

Role of Minerals in Dairy Ration.—By C. F. Huffman, Ph.D., Michigan State College Agr. Exp. Sta., East Lansing.

Dairy Cattle Housing.—Plans, specifications and description of housing for herds of various sizes. Applicable to the north central states. University of Wisconsin Agr. Exp. Sta., Madison.